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ABSTRACT

This study examines the relative effects of motivational orientation, ability, social class, sex, and instructions to employ verbal mediation on a paired-associates (PA) learning task. One hundred ninety-two seventh and eighth grade students were categorized according to degree of Intrinsic Task Motivation (IM), ability, and social class (SES). The experimental variable was the presence or absence of instructions to form a verbal mediation between PA elements (nouns). A significant four-factor interaction (IM x Sex x Ability x Trials) was found along with one significant three-factor interaction and several two-factor interactions. There were significant main effects for Sex, Ability, and Trials. Simpler analyses were performed separately for boys and girls, each yielding significant three-factor interactions (IM x Ability x Trials). Additional subanalyses indicated that IM and Ability interact in a complex and different manner for boys and girls. Girls made fewer errors than boys, and high ability subjects made fewer errors than low ability subjects. (Author)

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GEORGE PEABODY COLLEGE FOR TEACHERS/NASHVILLE, TENNESSEE 37203

EFFECTS OF MOTIVATION ORIENTATION, ABILITY, SOCIAL CLASS, AND MEDIATION ON VERBAL LEARNING

by

Robert F. Behrens

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by

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George Peabody College for Teachers

10

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TABLE OF CONTENTS

PAGE

LIST OF TABLES vi

LIST OF FIGURES. vii

INTRODUCTION 1

Motivational Orientation: Theory and Research 2

Learning and Individual Differences. 9

PURPOSES AND EXPECTATIONS. 12

METHOD 13

Subjects 13

Instruments. 14

Procedure. 22

Analysis 25

RESULTS. 26

DISCUSSION 40

REFERENCES 56

APPENDICES 64

A REVIEW OF THEORY AND RESEARCH ON THE MOTIVATIONAL ORIENTATION (MOTIVATOR-HYGIENE) CONSTRUCT. 65

B INDIVIDUAL DIFFERENCES AND PA LEARNING IN CHILDREN 78

C INSTRUCTIONS TO SUBJECTS 88

D THE CHOICE-MOTIVATOR SCALE 94

E JOB INTEREST QUESTIONNAIRE 97

TABLE OF CONTENTS
(Continued)

PAGE

F INSTRUCTIONS TO JUDGES SCORING JOB INTEREST QUESTIONNAIRE FOR SES GROUPINGS. 100

G LIST OF WORD-PAIRS USED IN THE PA LEARNING TASK. 103

H SAMPLE PAGE OF PA RESPONSE BOOKLET 105

I RAW DATA 107

BIBLIOGRAPHY 123

LIST OF TABLES

TABLE		PAGE
1	Summary Table of Ability Scores.	15
2	Summary Table of Motivational Scores	16
3	Six-Way Analysis of Variance of Error Scores	27
4	Three-Way Analysis of Variance of Errors for Females	33
5	Three-Way Analysis of Variance of Errors for Males	34
6	Two-Way Analysis of Variance of Errors for High-IM Males . .	36
7	Two-Way Analysis of Variance of Errors for Low-IM Males. . .	37
8	Two-Way Analysis of Variance of Errors for Low-IM Females	38
9	Two-Way Analysis of Variance of Errors for High-IM Females.	39
10	Raw Data	107

LIST OF FIGURES

FIGURE		PAGE
1	PA Errors by Trials for All Subjects	41
2	PA Errors over Trials as a Function of Ability Levels in High-IM Male Subjects	44
3	PA Errors over Trials as a Function of Ability Levels in Low-IM Male Subjects.	45
4	PA Errors over Trials as a Function of Ability Levels in Low-IM Female Subjects.	46
5	PA Errors over Trials as a Function of Ability Levels in High-IM Female Subjects	47
6	PA Errors over Trials as a Function of IM Level for High Ability Female Subjects	49
7	PA Errors over Trials as a Function of IM Level for Low Ability Female Subjects.	51

EFFECTS OF MOTIVATIONAL ORIENTATION, ABILITY, SOCIAL CLASS, AND MEDIATION ON VERBAL LEARNING

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The relative effects of motivational orientation, ability, social class, sex, and instructions to employ verbal mediation on a paired-associates (PA) learning task were examined. Subjects were 192 male and female seventh and eighth grade students selected from a larger sample. Motivational orientation was described by the subjects' scores on a scale that measured degree of intrinsic task motivation (IM), and subjects were categorized into High-IM and Low-IM groups. Ability test scores were cast into a frequency distribution, and subjects were assigned to High, Middle, or Low Ability groups. Social class (SES) judgements were based on parents' education and occupations. The instruction to form a verbal mediator between PA elements (nouns) or the absence of such instructions was the experimental variable. The PA error scores were analyzed by a six-factor analysis of variance, with IM, Ability, Sex, SES, and Mediation/Non-mediation the between-groups effects, and Trials the within-groups effect. A significant four-factor interaction, IM x Sex x Ability x Trials, was found along with one significant three-factor interaction and several two-factor interactions. There were significant main effects for Sex, Ability, and Trials. Simpler analyses were carried out separately for boys and girls, both yielding significant three-factor interactions (IM x Ability x Trials).

Additional subanalyses indicated IM and Ability interact in a complex and different manner for boys and girls. Girls made fewer errors than boys, and high ability subjects made fewer errors than low ability subjects.

Introduction

There exists widely the opinion that the major contribution of psychology to knowledge has been the systematic study of the process of learning. It has been suggested (e.g. Glaser, 1967) that the history of this endeavor has been marked by the development of two separate disciplines within scientific psychology that have been variously described as the correlationist-psychometric school and the experimentalist-psychonomic school. The principal concern of the former has been the identification and measurement of individual differences. The experimentalist-psychonomic group has been concerned with developing laws of learning, with comparatively little emphasis on individual differences. That these differences have continued to exist through the years was noted by Cronbach (1957) in his presidential address to the American Psychological Association on "The Two Disciplines of Scientific Psychology." Jenkins has suggested that ". . . this is in part a function of the differences in temperament, training, and interest of the experimentalist and the differential psychologist . . . and in part a function of the state of the field (1967, p. 45)."

Learning theorists have not totally ignored the uniqueness of the individual as a major factor in the study of learning. Hull (1943) admitted to his theoretical formulations motivational and experimental consideration of the individual, but despaired of predicting the variable outcomes when skill and habit interact with personality and motivation. In a later article, Hull (1945) proposed that a natural science theory of behavior should include both an attempt to derive primary laws by

utilizing an "average organism," and a concern about behavioral differences, when conditions are held constant. While he admitted the presence of environmental or acquired differences between organisms, his main concerns were innate or constitutional individual differences.

Spence (1956, 1960) began with Hull's basic formulation and elaborated considerably the generalized drive factor, D, by considering the role of manifest anxiety (one operational definition of D) as a major parameter in the acquisition of the conditioned eyelid response.

A relatively recent trend toward the unification of these different systematic approaches has occurred as the result of the growing interest of developmental psychologists in the study of how children learn, and in the sources of individual differences in children's learning. Stevenson, Hale, Klein, and Miller (1968) observed that while there has been an abundance of studies relating IQ to school performance, psychologists interested in mental retardation and cultural deprivation have recently used laboratory learning tasks and related them to IQ and other variables.

The present research was designed to examine the effects upon verbal learning of some non-intellectual factors while controlling the effect of ability. The factors, other than ability, that were considered included motivational orientation, socio-economic status, and sex.

Motivational Orientation: Theory and Research

The importance of personality or motivational variables in the

study of learning has been widely noted. Haywood (1964) has proposed a research model that might be used to study personality development in a mentally retarded population. The model uses the concept Motivational Orientation (MO) as a heuristic parameter. It is based on the industrial research of Herzberg, Mausner, and Snyderman (1959), who developed the "Motivator-Hygiene" construct while studying job satisfaction and job dissatisfaction.

Their industrial research, and later research in mental health (Herzberg & Hamlin, 1961), suggested that individuals can be efficiently described as being more or less motivated by two general motivational systems. Extrinsic Motivation (EM) in an individual means that he avoids distress by seeking the satisfaction of environmental needs, i.e., the seeking of physical comfort, safety, security, ease, and the avoidance of unpleasantness. The intrinsically motivated (IM) individual obtains basic satisfaction from task-oriented behavior and/or an approach toward tension-inducing situations (Haywood & Dobbs, 1964). Examples of IM behaviors are an eagerness to learn, the acceptance of a challenging situation, and the appreciation of beauty. These motivational systems were originally named motivator and hygiene, but were re-named by Haywood and Weaver (1967) in an attempt to emphasize personality traits as opposed to the sort of reinforcements an individual seeks.

The measurement of motivation orientation was first accomplished by structured interviews (Herzberg, et al., 1959). Hamlin and Nemo (1962) devised a self-report questionnaire which they called the

Choice-Motivator (C-M) Scale. More recent research with children (Haywood, 1966, 1968c) has resulted in the development of an objective form of the C-M Scale. The Hamlin and Nemo version of the C-M Scale allowed the scoring of each response as either EM, IM, or unclassified. Therefore, a subject had both an IM score and an independent EM score. The objective revision of the C-M Scale results in a single motivation score, with high scores classified as IM and low scores as EM. In the present study, subjects with high scores on the C-M Scale were classified as high-IM while subjects with low scores were classified as low-IM to reflect the use of a single scale of measurement. Therefore, in the present study, low-IM is equivalent to what has previously been termed EM. A more complete description of the C-M Scale and research in Motivational Orientation is presented in Appendix A.

Previous research has related Motivational Orientation to mental health (Fantz, 1962; Hamlin & Nemo, 1962; Herzberg & Hamlin, 1961, 1963; Sandvold, 1962). Research at Peabody College has studied motivational orientation and differential effects of varying reinforcers (Haywood & Weaver, 1967), motivational orientation and other personality variables (Haywood, 1968b), and the effects of motivational orientation on school achievement (Dobbs, 1967; Haywood, 1968a, 1968b, 1968c; Haywood & Dobbs, 1964; Kahoe, 1966; Wooldridge, 1966).

A thorough search of the literature has yielded only three studies in which motivational orientation was an independent variable and a laboratory learning task was the dependent variable. The first of these (Haywood & Wachs, 1966) used adolescent subjects of average IQ (mean of

105) and adolescents with below-average IQs (mean of 76). Subjects were selected for high-motivation or high-hygiene orientations on the basis of C-M scores. The learning task was a visual size-discrimination problem with form and position irrelevant. The correct size, whether small or large, was counterbalanced for each group. A task effort, pressing on a pedal with the foot, was controlled by the experimenter to be either relevant or irrelevant to the discrimination task. Each subject was given massed trials to a criterion on two successive days. After achieving criterion the correct size was reversed and the subject was run to criterion in the reversal procedure. In the low-IQ group IM subjects took fewer trials to learn than did EM subjects. Task effort or relevance did not affect acquisition scores. With acquisition scores adjusted by a covariance technique, EM subjects solved reversal more quickly than did IM subjects. Among the subjects with average intelligence there was no difference in acquisition between IM and EM, and again there was no significant effect of task effort or task relevance. There was a difference between groups in speed of learning to criterion on day two with IM subjects significantly faster than EM subjects. The reversal effect found in the lower IQ group did not occur in the average IQ subjects. The data for all groups suggested that IM subjects learned more quickly than did EM subjects with one exception, the previously noted IQ-IM reversal phenomenon. It should be noted that this study was carried out at a residential center that trains adolescents who are almost exclusively from low socioeconomic, culturally deprived families.

Wachs (1968) continued the study of the effects of directional-motivation orientation on laboratory learning tasks by using a free-recall verbal learning procedure with a public school population. His subjects were fourth, eighth, and twelfth grade students from the Pittsburgh City School System. Group IQ tests allowed subjects to be placed into one of three IQ levels: EMR, average, and superior. On the basis of C-M scores, subjects were categorized as IM, mixed, or EM. The free-recall task involved giving subjects a list of 50 nouns of 3, 4, or 5 letters to learn. The words were presented to subjects by means of a tape recording, then a test of retention was administered. There were five learning-testing trials on one day, and a retention trial the following day. Data were words recalled on each trial and on retention. The overall analysis of variance yielded no significant fourth order or third order interactions; however, the second order within groups interactions were significant including the motivation by trials effect. On simpler analysis the age by trials interaction proved significant, with older students showing better recall. The IQ by trials interaction proved nonsignificant for trials 2 through 5. In the motivation by trials analysis the IM and mixed groups were not different, but were superior to the EM group. This difference increased over trials. These data are not surprising in light of Jensen's (1968) contention that free-recall learning is relatively culture-free and, therefore, less affected by motivational variables.

A study (Haywood, Heal, Lucker, Mankinen, & Haywood, in press) of institutionalized retardates' performance on a visual paired-associates

learning test also considered the effects of motivational orientation on learning. The subjects were grouped into three IQ levels (40-49, 55-64, 70-79), were given the C-M Scale, and were divided into a passive-visual study procedure and a visual-motor procedure. The latter group were required to make a motor response in the presence of the stimulus-response pair, while the passive group learned under the more usual paired-associates (PA) technique. Retention tests were given to all subjects immediately following learning, and they were assigned to groups to be retested 1, 2, 4, or 8 weeks following learning. After adjustment for original learning, the IQ groups did not differ in retention scores. The visual-motor method of presentation resulted in fewer errors in the middle IQ group, but had no effect on the low and high IQ groups. The motivational effects were not significant.

The results of these studies are not sufficient to warrant the conclusion that motivational orientation is a primary factor in accounting for individual differences in laboratory learning tasks. Neither can one conclude that MO has little value in predicting laboratory learning. It is this writer's contention that subject selection and/or failure to control for socioeconomic status (SES) has contributed significantly to the ambiguous results reported in these learning studies. Jensen (1968) has presented a strong case for the control of SES in studying learning in children. The Haywood and Wachs (1966) study used a subject population composed almost entirely of adolescents from culturally deprived, low SES homes. Haywood, et al. (in press) studied a population institutionalized at a state hospital for the mentally retarded.

Sarason and Gladwin (1958) contended that many of the mentally retarded are from the most socially and economically deprived families. Although Wachs (1968) probably employed a heterogeneous subject population he, too, failed to control for the effects of SES.

There has been both direct and indirect evidence in the expanding literature to suggest that SES and motivational orientation are related. At least five industrial studies of Herzberg's theory have specifically considered occupational level (Bloom & Barry, 1967; Centers & Bugental, 1966; Champagne & King, 1967; Friedlander, 1966; and Malinovsky & Barry, 1965). These studies suggest that motivational orientation has greater predictive validity among higher status occupational groups than in lower status occupations. Since occupational status and SES are closely related, it may be argued that intrinsic motivation is less prevalent in low SES than in middle and upper SES groups. The industrial studies included only adult subjects. It would seem reasonable to assume that children would tend to reflect the motivational orientation of the significant adults in their lives. There is some evidence to support this assumption (Call, 1968; Weaver, 1966; Wooldridge, 1966).

While this selective review of the motivational orientation literature supports the suggestion that MO and SES interact, the underlying mechanisms fostering this interaction are not clear. Hunt (1961, 1965) effectively developed a theoretical framework for the development of motivational states, especially the development of intrinsic motivations, by tracing the process of language acquisition. It is Hunt's contention

that lower and middle classes' psychological differences are most apparent in language and in motivation. Language deficits, according to Hunt, lead to extrinsic motivational states. Hunt's theorizing is both logically consistent and well buttressed by empirical evidence. An impressive body of literature (Jensen, 1968; Klaus & Gray, 1968; Whiteman & Deutsch, 1968) had built up pointing to differences in language development that can be attributed to environmental differences, e.g., SES differences. Bernstein (1960, 1961) has examined language differences between lower and middle class Britons. Lower class children write less well syntactically and grammatically, show less sequential organization, and have deficiencies in the logical process of their writing. More basic research (Entwisle, 1966; John, 1963) has demonstrated clear class differences, even among young children, in word associations.

Learning and Individual Differences

Theory (e.g., Gagné, 1963) and empirical evidence (e.g., Jensen, 1968) support the contention that individual differences are reflected to a greater or lesser degree in the various verbal learning methodologies. Jensen (1961, 1968) has used free-recall, serial learning, and paired-associates learning techniques with children of varying SES backgrounds. According to Jensen the free-recall method is least sensitive to cultural differences and paired-associates learning is most sensitive to previous verbal experiences, hence most clearly reflects cultural differences. Rapier (1966) studied serial and paired-associates

learning among children varying in SES and measured intelligence. Her research indicates that IQ is a better predictor of learning, especially paired-associates learning, in middle and upper SES children than it is in lower SES children.

Jensen and Rohwer (1963a, 1963b, 1965) have examined the effects of mediation on children differing in SES and IQ. They maintain that syntactical mediation facilitates the acquisition of new associations. By instructing subjects to form sentences with the stimulus elements in a paired-associates task, they were able to demonstrate reliably faster learning when compared to merely requiring subjects to name the stimulus elements. Serial learning was not facilitated by mediating instructions. While kindergarten children and twelfth graders were not significantly helped by the mediating instructions, the PA learning of second through tenth grade students was markedly facilitated by the instructions. The authors speculated that the youngest subjects did not have sufficient varied lingual experience to benefit from mediating instructions, whereas the twelfth grade students appear to mediate without being instructed to do so. Other studies (Davidson, 1964; Rohwer, 1964) have established that conjunctions do not facilitate learning while prepositions and verbs do facilitate PA learning. Jensen (1968) has argued that children develop associative networks as the result of verbal experiences. These networks provide relevant verbal mediators that facilitate further verbal learning. He cited evidence that younger, lower SES, and duller children are more affected by mediation instructions than are older, higher SES, and brighter children.

Three extensive research efforts with children (Duncanson, 1964; Stake, 1961; Stevenson, Hale, Klein, & Miller, 1968) have all independently established the significant positive relationship between paired-associates learning and IQ, and significant relationships between paired-associates learning and academic achievement. Since the relationship between IQ and school achievement is well established (Anastasi, 1961) it is possible that paired-associates learning reflects some of the "non-intellective" variables (e.g., motivation, personality) that suppress the IQ-achievement relationship. Several studies have shown that motivational or personality variables have an influence on PA learning (Jensen, 1968; Stevenson & Odom, 1965; Waite, Sarason, Lighthall, & Davidson, 1958).

The present research has utilized the paired-associates learning methodology in the study of the effects of motivational orientation on learning. The research previously cited suggests that paired-associates learning is unique among verbal learning methodologies for the following reasons:

(1) PA correlates highly with school achievement (Stevenson, et al., 1968)

(2) PA is sensitive to motivational differences (Jensen, 1968; Stevenson & Odom, 1965; Waite, et al., 1958).

(3) PA is sensitive to SES differences (Jensen, 1961, 1968; Rapier, 1966).

(4) PA is sensitive to IQ differences (Duncanson, 1964; Stake, 1961; Stevenson, et al., 1968).

(5) PA is affected by instructions to mediate (Jensen, 1968; Jensen & Rohwer, 1963a, 1963b, 1965).

Purposes and Expectations

The purpose of the present research was to investigate the relationship between motivational orientation and learning in children. The learning method selected for study was a paired-associates technique. The parameter experimentally manipulated was the presence or absence of instructions to mediate in PA learning. In addition to measuring motivational orientation, the present research also measured socio-economic status and used a measure of academic aptitude. The present research, therefore, investigated the relative effects of motivational orientation, SES, sex, and academic aptitude on mediated and non-mediated PA learning.

The following relationships were expected:

(1a) High IM subjects will learn the PA task more quickly than will low IM subjects under both mediated and non-mediated conditions.

(1b) Instructions to mediate will benefit low IM subjects more than high IM subjects.

(2a) Subjects higher in ability will learn more quickly than will subjects lower in ability.

(2b) Subjects lower in ability will benefit more from instructions to mediate than will subjects higher in ability.

(3a) Middle SES subjects will learn more quickly than will low SES subjects.

(3b) Low SES subjects will benefit more from instructions to mediate than will middle SES subjects.

(4) Girls will learn more quickly than boys.

(5) There are expected interactions between IM and ability, ability and SES, IM and SES, IM and sex, as well as more complex interactions. Girls who are high in IM, middle SES, high in ability, and who receive instructions to mediate will learn most quickly. Boys low in IM, low in SES, low in ability, and without instructions to mediate will learn least rapidly.

Method

Subjects

The total sample consisted of seventh and eighth grade children enrolled in the regular classes of the two public middle (junior high) schools in the city of Murfreesboro, Tennessee. The potential subject population of 860 students represented all socioeconomic levels. Prior to testing a statement of consent signed by a parent was obtained for all subjects. The actual sample of 595 included all subjects with parental permission, who were present for both test sessions and for whom the schools had a recorded recent test of ability.

Approximately 100 students were excluded because they failed to obtain parental permission or were absent on the day of the first testing session. Although there were probably more low SES subjects

absent or without permission, the key factor in obtaining parental permission seemed to be the attitude of the classroom teacher toward the research. In some classrooms the teacher made daily pleas to the students and even wrote personal notes to the parents, resulting in extremely high return percentages. An additional 172 subjects were lost from the study. Eighty of these subjects did not have a recent ability test recorded in their permanent records. Many of the subjects without test data had recently moved to the community, and a few had been absent during testing. Twenty-five subjects responded incorrectly or refused to cooperate during the first testing session. The remaining 67 subjects were given incorrectly assembled PA response sheets.

To obtain the sample used in the analysis of variance, subjects were first classified as High, Middle, or Low IM. The subjects were divided into High, Middle, and Low ability groups on the basis of their scores on the Cooperative School and College Ability Test (SCAT). Subjects were further classified as Male or Female and as Middle or Low SES. Tables 1 and 2 summarize these characteristics. Approximately one half of each group received Mediating instructions; the other half of each group received Non-Mediating instructions on the learning task. The analysis of variance sample consisted of 4 subjects randomly selected from those meeting the conditions for inclusion in each of the 48 IM-Ability-Sex-SES-Condition categories. Scores from a total of 192 subjects were included in the analysis of variance.

Instruments

(1) Choice-Motivator Scale. Motivational orientation was measured

Table 1

Summary Table of Ability Scores
(SCAT Standard Scores)

	7th Grade Males			7th Grade Females		
	N	Mean	s.d.	N	Mean	s.d.
Low IM	22	259.04	7.76	18	261.50	7.04
High IM	29	261.00	8.74	24	260.66	7.59
Low SES	25	258.80	7.63	20	259.95	7.96
Middle SES	26	261.46	8.70	22	262.00	6.91

	8th Grade Males			8th Grade Females		
	N	Mean	s.d.	N	Mean	s.d.
Low IM	26	273.73	11.08	30	273.20	8.39
High IM	19	275.10	10.87	24	274.37	10.02
Low SES	23	274.13	10.20	28	274.64	10.66
Middle SES	22	274.50	11.84	26	273.84	9.14

Table 2

Summary Table of Motivational Scores
(IM Scores)

	Male			Female			Total		
	N	Mean	s.d.	N	Mean	s.d.	N	Mean	s.d.
Low SCAT	32	11.78	2.76	32	11.87	3.05	64	11.82	2.95
Middle SCAT	32	10.93	3.46	32	11.68	2.76	64	11.31	3.89
High SCAT	32	11.00	2.90	32	12.40	2.59	64	11.70	2.88
Low SES	48	10.92	1.48	48	12.08	2.86	96	11.50	3.11
Middle SES	48	11.35	2.89	48	11.62	2.72	96	11.48	2.74

by a recently revised forced choice adaptation of the Choice-Motivator Scale devised by Hamlin and Nemo (1962). The original scale consisted of 20 pairs of vocational titles. Subjects were asked which of each pair they would prefer to be if they could choose either, and had to choose between the two titles. They were also asked to explain briefly the reason for their choice. Only the reason for the choice was included in the scoring. Kahoe (1966) submitted reasons for choiced to factor analysis and modified the scoring criteria. Haywood (1966, 1968c) further modified the C-M Scale by requiring subjects to select the reason for their choice from a list of ten reasons. The reasons provided his subjects were selected by analysis of the most frequently given reasons on the Hamlin and Nemo (1962) version of the C-M Scale. The forced choice version of the C-M Scale was used successfully by Dobbs (1967).

The reliability of the original C-M Scale was reported by Hamlin and Nemo (1962) to be .67 for IM scores and .65 for EM scores for adult subjects when a delayed-parallel-forms technique was employed. Haywood and Weaver (1967) found a split-half reliability coefficient of .69 for an IM - EM difference score, using a sample of institutionalized retardates. Solveiga Miezitis (personal communication) found a test-retest (two week period) reliability of .78 with seventh grade students using a forced-choice version of the C-M Scale. Kunca (1968) used a picture form of the C-M Scale with low-mental-age subjects. After controlling for a marked position bias, Kunca found test-retest reliability coefficients ranging between .65 and .88.

A more complete treatment of this scale as well as a copy of the scale can be found in the Appendices. The score used to classify subjects was the IM score which could range from zero to twenty. All seventh grade subjects were cast into a distribution with the lowest one-third designated Low-IM subjects and the highest one-third designated as High-IM subjects. The same procedure was followed with the eighth grade subjects. Both seventh and eighth grade distributions resulted in designating subjects with IM scores of 10 or lower as Low-IM, and those with scores of 13 or higher as High-IM.

(2) Job Interest Questionnaire. A questionnaire was developed that, superficially, appeared to be directed toward obtaining information about each subject's vocational interests and aspirations. The actual purpose was to secure information for making judgements about present socioeconomic status. The Job Questionnaire, modeled after one developed by Whiteman and Deutsch (1968), obtained information about parents' occupations (both title of occupation and a description of job function), parents' education, number of rooms in the home, and number of persons living in the home. The Job Questionnaire and instructions for judging the questionnaire can be found in the Appendices.

Each questionnaire was examined independently by two judges. They assigned subjects to Group I (low SES) or to Group II (middle or high SES) on the basis of all the information available on the questionnaire. Kahl and Davis (1955) made a factorial study of various indices of SES and found occupation to be the best single predictor

and education to be the second best predictor. In the present study, the judges were instructed to consider occupation first, then education, with the remaining information to be used only when the first two items were unclear. In general, Group I subjects were the children of parents who had unskilled or semi-skilled jobs and who had not received educational experiences beyond the high school level. Group II subjects had parents who were military personnel, had skilled, technical, supervisory, or professional jobs and/or had received technical training or higher education.

The judges were in agreement in 94 percent of the cases. The remaining 6 percent were arbitrated by the experimenter or were excluded. The unclear cases were approximately two-thirds Group I and one-third Group II, the same proportions found in the cases clearly agreed upon.

(3) Cooperative School and College Ability Tests (SCAT). The SCAT is routinely administered to all sixth and eighth grade students in the Murfreesboro City School System. The SCAT is a series of tests that measure academic aptitude. They are not IQ tests, since they employ a standard score other than the IQ. The SCAT was designed to measure "developed abilities," and emphasizes word knowledge and arithmetic processes the student should have learned in school. "In this respect, SCAT does not really differ from other intelligence tests . . . it only makes overt a condition sometimes unrecognized in other tests (Anastasi, 1968, p. 224)." The reliability of the SCAT has been reported to be .88 to .96 for internal consistency. Predictive validity of the

SCAT for seventh grade children yields coefficients of .65 to .70 when SCAT Verbal score is correlated with English grades, SCAT Quantitative with mathematics grades, and SCAT Total with social studies and science grades. The publishers have reported that for a sample of 100 Delaware seventh grade students the correlation obtained between the SCAT Total score and IQ scores measured by the Wechsler Intelligence Scale for Children was .77.

The SCAT Total standard scores for all seventh grade subjects were cast into a frequency distribution. Subjects in the lowest one-third of the distribution were designated Low Ability Group, those in the middle one-third were designated Average Ability Group, and those in the highest one-third wwre designated the High Ability Group. The same procedure was followed with the eighth grade students.

(4) The criterion task was a form of paired-associates learning. PA learning involves the administration of a series of two stimuli presented simultaneously (i.e., the learning trial). This series of pairs (PA list) is followed by a test trial in which one of the two stimuli is presented and the second of the pair is absent and must be recalled or recognized by the subject. The usual PA procedure is to require the subject to recall, orally or in written form, the missing element from the stimulus pair. Most often subjects are tested individually. Stake (1961) studied the effects of various modes of presentation on learning tasks, and found that his seventh grade subjects tested in groups on a PA task did not perform differently from those tested individually. Stevenson et al. (1968) used a group testing procedure with

third through seventh grade children. Among the various learning tasks used were two forms of PA learning, one pairing consonant-vowel-consonant trigrams with words, and the other pairing CVC's with Japanese Kanji or configurations. The Stevenson et al. (1968) study employed a recognition technique rather than the typical recall procedure. This technique uses the usual presentation of paired stimuli for learning, but the test procedure uses a booklet with the stimulus elements arranged in a column along the left side of the page, and the response elements in rows to the right of each test stimulus. The subjects were instructed to circle the one response element that went with the stimulus on the left. The stimulus-response pairs were presented six times on a screen with a test trial following each presentation.

The verbal learning procedure used in the present research was a modification of the Stevenson et al. (1968) group testing procedure for PA learning. The use of mediational instructions suggested that common English words be the stimuli used instead of nonsense syllables or abstract forms. The stimuli were ten pairs of four-letter common nouns selected from Palermo and Jenkins' (1963) Word Association Norms. The stimuli were word pairs with the low associative strength of 0 or 1 for seventh and eighth grade males and females. Response forms were prepared that contained a column of stimulus words and rows of response words and masking words. The correct response word was mixed among nine masking response words. Subjects were required to select the correct response word from among 10 possible response words. Among the incorrect or masking stimuli were two words of known high associative

strength with the stimulus word, a word synonymous with or highly associated with the correct response word, two words that sounded like or were homonyms of the response word, a word that sounded like or was a homonym of the stimulus word, two words that were correct responses to other stimulus words, and one other stimulus word. Although the response word and its masking words were held constant through each of the six response trials, the relative positions of the response word and the masking words were rearranged in a predetermined random order, as was the order of the stimulus words. The stimulus-response word pairs, the response booklets, and the exact instructions used are presented in the Appendices.

Procedure

All subjects in the study were group-tested in their own classrooms. Since parental permission was required, all students without signed permission statements were excused to another part of the school. Precautions were taken to assure that excluded students were in no way ridiculed by their peers. No subject was required to participate. All were advised that they could refuse to answer any or all questions. Less than two percent of the subjects purposefully left out answers. The Job Interest Questionnaire and the Choice-Motivator Scale were administered in one testing session, with the Choice-Motivator Scale administered first. The examiner read standard instructions to the class and then allowed the class to finish the test by themselves. At least two proctors circulated in each classroom to assure that the correct procedure was followed. The Job Interest Questionnaire was

administered after completion of the Choice-Motivator Scale. Each question was read aloud to the class and subjects were allowed to seek clarification. This procedure proved somewhat frustrating to the faster students, who were required to wait for their slower classmates, but it assured understanding of all questions.

The verbal learning task was also group-administered to the students in their own classrooms. The second testing followed the initial screening by several months, and all students not present for the first testing were excused from the learning task. A pretesting of the PA task at another school had revealed that students talked to each other about the word pairs they had learned. To avoid contamination of the verbal learning task, all students at each of the two schools were tested during a two-hour block of time so that students were unable to talk to each other about the task. The block testing required eight teams of three examiners who tested simultaneously. The examiners were rehearsed in the procedures employed, and in the reading of the instructions. The procedure and instructions are included in the Appendices.

Subjects were told that the examiner was studying the ways in which language is learned. It was emphasized that the task was not an IQ test and would not affect grades in any way. Students were told that they would be shown pairs of words projected on a screen. The subjects' task was to remember the pairs of words and to mark the correct response word in their test booklets.

One-half of the subjects were assigned to the Non-Mediated (NM) conditions. The NM instructions were: "The word pairs are like:

COW-HAT. Your job is to remember that COW and HAT go together." Half of the subjects were assigned to the Mediated (M) condition. Mediation instructions were: "The word pairs are like: COW-HAT. Your job is to remember that COW and HAT go together. They may be easier to remember if you make up a sentence with them. For example, you could say 'The COW is wearing a HAT.' Try to remember the word pairs by making up a short sentence with both words." The difference between the Mediated and Non-Mediated conditions was that subjects in the Mediated group were instructed to form a sentence in order to remember, whereas those in the Non-Mediated group were asked only to remember the word pairs. The instructions differed only prior to the first trial. They were exactly the same following the first learning trial.

The word-pairs were white block letters photographed on a light blue background. Each pair was on a separate 35 mm. color slide. The slides were projected by a Kodak Carousel projector placed 12 to 15 feet from a wall-mounted screen. A trial consisted of a one-second exposure of each word pair, with a .6-second inter-stimulus interval between each pair. The 10 word-pairs were shuffled in a pre-arranged random pattern for each of the six trials.

Each booklet was scored for number of errors on each trial. An error was an incorrect word circled. The scoring was done by undergraduate research assistants. As expected with an objective scoring procedure, spot checks by the experimenter confirmed a high degree of accuracy in scoring.

Analysis

The dependent variable was the number of errors on each trial of the PA learning task. The primary analysis was a six-way (2 x 2 x 2 x 2 x 3 x 6) analysis of variance (ANOVA). The between groups dimensions were motivation orientation, SES, sex, ability, and mediating/non-mediating instructions (hereafter referred to as Conditions). The within subjects dimension was trials. Simpler analyses of variance were used to clarify specific relationships involved in interactive effects. The complex six-way ANOVA required an equal number of subjects in each cell. Since all subjects to be considered for the ANOVA had completed all six trials, the problem was to fill each of the 48 between groups cells with an equal number of subjects.

Earlier in this paper the procedure for assigning subjects to categories (cells) was described. All subjects were cast into a frequency distribution on the basis of their IM score. The lowest one-third were designated Low-IM; the highest third were High-IM. SCAT-Total standard scores were also cast into a frequency distribution which was then divided into thirds. A subject was labeled High, Middle, or Low Ability depending on where his score fell in the frequency distribution. Subjects were also classified Low or Middle SES, and as Male or Female. One-half of the subjects received instructions to mediate in PA learning, while the others did not recieve mediating instructions (Conditions). Each of the categorizations was done independently of the others. Since some of the factors were expected to be related, e.g., ability and SES, it was expected that there would not be an equal N in

each cell. For example, there were four subjects designated: Female, Low-IM, Low-SES, High-Ability, Non-Mediated. There were 25 subjects designated: Female, Low-IM, Low-SES, Low-Ability, Non-Mediated. The smallest number of subjects observed in any one cell was four and the largest number was 27. To avoid bias in the selection of subjects among those cells with more than four subjects, each subject was assigned an identification number, and the first four numbers encountered in a table of random numbers were selected. The ANOVA group of 192 subjects was selected as described from the pool of 595 available subjects.

Results

The number of errors on each trial of the PA learning task was first analyzed in a six-way analysis of variance (2 x 2 x 2 x 2 x 3 x 6). Alpha was set at .05. The summary table for this analysis is given as Table 3. The analysis summarized in Table 3 indicates that the six-factor ABCDEF (IM x SES x Sex x Ability x Conditions x Trials) interaction proved to be nonsignificant. None of the possible five-factor interactions reached significance. One of the 10 possible four-factor within groups interactions, and none of the between groups four-factor interactions proved significant. The within groups ACDF (IM x Sex x Ability x Trials) interaction yielded an F-ratio of 2.185 ($p = .017$).

There were 10 possible three-factor between groups interactions and 10 possible three-factor within groups interactions; only one reached significance. The ADF (IM x Ability x Trials) interaction resulted in an F-ratio of 2.065 ($p = .025$). Two of five within groups two-factor interactions were significant. The CF (Sex x Trials) interaction yielded an

Table 3

Six-Way Analysis of Variance
of Error Scores

Source		Degrees of Freedom	Mean Square	F	p
Between Groups					
Motivation	(A)	1	1.837		
SES	(B)	1	0.087		
Sex	(C)	1	32.000	4.176	.040
Ability	(D)	2	58.948	7.692	<.001
Mediation/Non-Mediation	(E)	1	1.003		
AB		1	9.389	1.225	.269
AC		1	0.281		
AD		2	6.681		
AE		1	1.389		
BC		1	18.503	2.415	.118
BD		2	34.056	4.444	.013
BE		1	1.681		
CD		2	6.542		
CE		1	9.031	1.179	.279
DE		2	1.920		
ABC		1	3.555		
ABD		2	7.087		
ABE		1	0.087		

Table 3
(Continued)

Source		Degrees of Freedom	Mean Square	F	p
ACD		2	10.156	1.325	.268
ACE		1	0.056		
ADE		2	2.524		
BCD		2	2.837		
BCE		1	1.125		
BDE		2	3.066		
CDE		2	0.073		
ABCD		2	0.722		
ABCE		1	1.531		
ABDE		2	0.316		
ACDE		2	14.024	1.830	.162
BCDE		2	0.698		
ABCDE		2	1.156		
Error (b)		144	7.663		
Within Groups					
Trials	(F)	5	402.833	302.772	<.001
AF		5	1.691	1.271	.274
BF		5	0.599		
CF		5	8.929	6.711	<.001
DF		10	4.169	3.133	<.001

Table 3
(Continued)

Source	Degrees of Freedom	Mean Square	F	p
EF	5	2.441	1.835	.103
ABF	5	0.955		
ACF	5	0.856		
ADF	10	2.747	2.065	.025
AEF	5	0.997		
BCF	5	0.945		
BDF	10	1.368	1.028	.418
BEF	5	1.055		
CDF	10	1.308		
CEF	5	0.256		
DEF	10	2.170	1.631	.093
ABCF	5	1.127		
ABDF	10	1.066		
ABEF	5	1.283		
ACDF	10	2.907	2.185	.017
ACEF	5	0.827		
ADEF	10	0.545		
BCDF	10	0.566		
BCEF	5	0.271		
BDEF	10	0.841		

Table 3
(Continued)

Source	Degrees of Freedom	Mean Square	F	p
CDEF	10	0.923		
ABCDF	10	2.105	1.582	.107
ABCEF	5	2.589	1.946	.084
ABDEF	10	0.624		
ACDEF	10	1.182		
BCDEF	10	1.144		
ABCDEF	10	0.840		
Error (w)	720	1.330		
Total	1151	4.195		

F-ratio of 6.711 ($p < .001$), and the DF (Ability x Trials) interaction resulted in an F-ratio of 3.133 ($p < .001$). Of the 10 between groups two-factor interactions only one, BD (SES x Ability), reached significance with an F-ratio of 4.444 ($p = .013$). Table 3 also indicates that significant main effects were observed for Sex, Ability, and Trials. Girls made fewer errors than boys, and the Low, Middle, and High Ability groups differed in errors in the expected direction. The IM, SES, and Conditions (Instructions) main effects did not approach significance.

Based on the complex ANOVA results several of the expectations were supported while others were not supported. The expectation (1a) that High IM subjects would learn the PA task more quickly than the Low IM subjects was not supported by the complex ANOVA since the IM main effect did not reach significance. It was expected (1b) that instructions to mediate would benefit Low IM subjects more than High IM subjects. This expectation was not supported as the IM x Conditions (AE) interaction did not approach significance. The expectation (2a) that subjects higher in ability would learn more quickly than would subjects lower in ability was supported by the Ability (D) main effect that proved highly significant ($p < .001$). Subjects lower in ability (expectation 2b) did not benefit more from instructions to mediate as the Ability x Conditions (DE) interaction was not significant. The expected effects of SES (3a and 3b) did not appear. The SES main effect was not significant and the SES x Conditions (BE) interaction was not significant.

The expectation (4) that girls would learn more quickly than boys

was supported by the Sex (C) main effect (p= .04). The expectation (5) of simple and complex interactions was partially supported by the ANOVA results. SES was expected to interact significantly with both ability and motivation was well as being a component of the more complex interactions. The SES x Ability interaction was significant (p= .013); however, SES was not a component of any other significant interaction. The interactions between IM, Ability, and Sex were reflected in the significant (p= .017) four-factor within groups interaction ACDF. The simple effects of IM, Ability, and Sex were examined in a series of simpler analyses of variance. Data from male and female subjects were analysed separately.

Table 4 presents the summary table from the three-way analysis of variance for females, with Motivation and Ability the between groups variables, and Trials the within groups varaible. As can be seen in Table 4, the three-factor interaction (Motivation x Ability x Trials) was significant, yielding an F-ratio of 3.766 ($p < .001$). None of the two-factor interactions was significant, and among the main effects only the Trials effect was significant with an F-ratio of 120.339 ($p < .001$).

Table 5 presents the results of a three-way analysis of variance for males, an analysis comparable to that for females presented in Table 4. As indicated in Table 5, the three-factor interaction (Motivation x Ability x Trials) proved significant, yielding an F-ratio of 2.703 (p= .003). Of the two-factor interactions only the Motivation x Trials interaction was significant with an F-ratio of 4.118 (p= .001).

Table 4

Three-Way Analysis of Variance
of Errors for Females

Source		Degrees of Freedom	Mean Square	F	p
Between Groups					
Motivation	(A)	1	0.340		
Ability	(B)	2	17.255	2.224	.111
AB		2	12.220	1.575	.210
Error (b)		90	7.756		
Within Groups					
Trials	(C)	5	147.370	120.339	<.001
AC		5	0.419		
BC		10	0.651		
ABC		10	4.612	3.766	<.001
Error (w)		450	1.224		
Total		575	3.652		

Table 5

Three-Way Analysis of Variance
Of Errors for Males

Source		Degrees of Freedom	Mean Square	F	p
Between Groups					
Motivation	(A)	1	81.000	12.358	.001
Ability	(B)	2	3.755		
AB		2	9.484	1.447	.239
Error (b)		90	6.553		
Within Groups					
Trials	(C)	5	264.391	195.879	<.001
AC		5	5.558	4.118	.001
BC		10	0.503		
ABC		10	3.648	2.703	.003
Error (w)		450	1.329		
Total		575	4.688		

The Ability main effect was not significant. The Motivation effect was significant for boys with an F-ratio of 12.358 ($p = .001$). The Trials effect was also significant with an F-ratio of 195.879 ($p < .001$).

The significant three-factor interactions found in Tables 4 and 5 indicated the need for further simple analyses of variance. Four two-way analyses of variance were executed with Ability the between groups effect and Trials the within groups effect. Separate analyses were done for High-IM Males (Table 6), Low-IM Males (Table 7), High-IM Females (Table 8), and Low-IM Females (Table 9).

The analysis summarized in Table 6 for High-IM Males indicates the absence of a significant two-factor interaction and the presence of significant main effects. The main effect of Ability yielded an F-ratio of 4.495 ($p = .028$). The effect of Trials resulted in an F-ratio of 43.470 ($p < .001$). Table 7 summarizes the analysis for Low-IM Males. The two-factor interaction was not significant. The Ability main effect was significant with an F-ratio of 8.089 ($p = .004$). The Trials main effect was also significant with an F-ratio of 98.828 ($p < .001$).

Table 8 presents the summary of the two-way analysis of variance for Low-IM Females. The results indicated a significant two-factor interaction (Ability x Trials) with an F-ratio of 3.385 ($p < .001$). The main effects were also significant. The Ability main effect resulted in an F-ratio of 4.862 ($p = .012$). The Trials effect yielded an F-ratio of 66.239 ($p < .001$).

Table 9 summarizes the results of the two-way analysis of variance for High-IM Females. There was no significant interaction. Unlike the

Table 6

Two-Way Analysis of Variance of
Errors for High-IM Males

Source		Degrees of Freedom	Mean Square	F	p
Between Groups					
Ability	(A)	2	32.597	4.495	.028
Error (b)		15	7.251		
Within Groups					
Trials	(B)	5	110.547	43.470	<.001
AB		10	3.393	1.334	.211
Error (w)		255	2.543		
Total		287	4.909		

Table 7

Two-Way Analysis of Variance of Errors for Low-IM Males

Source		Degrees of Freedom	Mean Square	F	p
Between Groups					
Ability	(A)	2	20.253	8.089	.004
Error (b)		15	2.503		
Within Groups					
Trials	(B)	5	155.972	98.828	<.001
AB		10	2.444	1.567	.116
Error (w)		255	1.578		
Total		287	4.477		

Table 8

Two-Way Analysis of Variance of Errors for Low-IM Females

Source		Degrees of Freedom	Mean Square	F	p
Between Groups					
Ability	(A)	2	28.847	4.862	.012
Error (b)		45	5.933		
Within Groups					
Trials	(B)	5	75.945	66.239	<.001
AB		10	3.880	3.385	<.001
Error (w)		225	1.147		
Total		287	3.488		

Table 9

Two-Way Analysis of Variance of Errors for High-IM Females

Source		Degrees of Freedom	Mean Square	F	p
Between Groups					
Ability	(A)	2	0.628	0.066	.936
Error (b)		45	9.579		
Within Groups					
Trials	(B)	5	71.845	55.150	<.001
AB		10	1.383	1.061	.393
Error (w)		225	1.303		
Total		287	3.830		

three preceding two-way ANOVAs, there was no significant Ability main effect. The Trials main effect was significant with an F-ratio of 55.150 ($p < .001$).

Discussion

Paired-Associates Learning

This section will examine the PA learning task used in the present study. It was based on the mothod used by Stevenson et al. (1968), and differs somewhat from the recall techniques commonly used for the study of PA learning. There are distinct advantages to the present method. Scoring is clearly objective. Misspelled and mispronounced words are not a problem. Also, this method is well adapted to group testing. By far the greatest objection to the objective method used is that it may not be directly comparable to the recall procedure used in most of the previous PA learning research. The comparability of results from the two methods should be examined carefully.

There is no question that learning occurred. There were significant Trials effects in all seven of the analyses of variance ($p < .001$ in each analysis). Figure 1 presents graphically the mean errors over each of the six trials for all subjects. It is apparent that most of the learning occurred on the first trial. Little improvement occurred after the fourth trial. Visual inspection indicated that the curve was a typically negatively decelerating curve commonly obtained for error scores in laboratory learning tasks. It appears that six trials were sufficient for learning to occur, and it is doubtful that further exposure

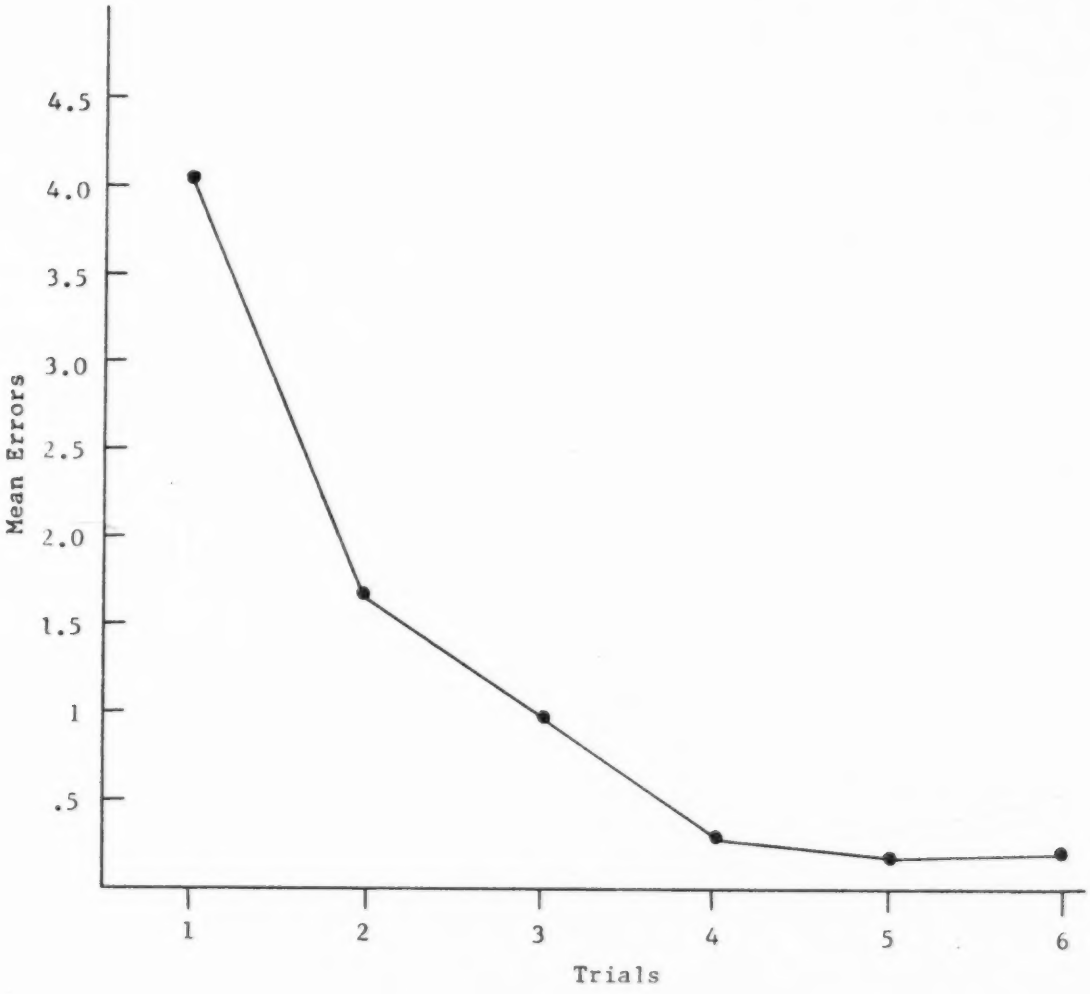

Figure 1. PA errors by trials for all subjects.

would have led to much improvement. Some subjects were able to recognize all of the 10 word pairs correctly on the first trial, while others never were able to achieve an error-free trial. Most learning tasks administered to subjects of varying ability levels suffer from a floor or ceiling effect. This task was apparently too easy for some subjects and almost too difficult for other subjects. Since learning clearly did occur, and since many of the parameters did have an effect on the learning, it would appear to have been an acceptable learning task for the purposes of the present experiment. Further consideration of the characteristics of the task will be made when some of the parameters are considered individually.

Motivation and PA Learning

The primary expectation about the relationship between motivational orientation and PA learning was that High-IM subjects would learn more quickly than would Low-IM subjects. This relationship was expected as a main effect in the six-way analysis of variance. It was not supported. The significant four-factor interaction did contain an IM factor. When this interaction was examined by means of separate three-way analyses or variance for males and females, the reason for the failure to obtain a motivation main effect became more apparent. Both three-way analyses had a significant three-factor interaction, but only the analysis for male subjects had a significant ($p < .001$) motivation main effect. A further breakdown of the male subjects into High-IM males and Low-IM males, and subsequent two-way AVONAs on these groups, yielded similar

results. In both analyses (Tables 6 and 7) there were no two-factor interactions, and the Ability main effect was significant. Figures 2 and 3 present mean errors for each trial for the three ability levels. In Figure 2 for High-IM boys, the High-Ability group consistently made the fewest errors. The Middle-Ability and Low-Ability groups reversed, however, with the Middle-Ability group making more errors on the first four trials. The mean scores displayed in Figure 3 are as expected.

The data for girls were considerably different from those for the boys. In the three-way ANOVA there was no significant motivation main effect, but there was a significant three-factor interaction that included the motivation factor. In a further breakdown of the data, a two-way analysis of variance for Low-IM females yielded significant main effects as well as a significant two-factor interaction. The data are plotted in Figure 4. The interaction seems to be the result of the criss-crossing of the Middle- and Low-Ability groups between trials 2 and 5. There is no apparent explanation for this criss-crossing and the resultant interaction. It would seem safest at this time to consider the interaction the effect of random variation.

The High-IM females, unlike all other groups, did not show an ability main effect. The two-way ANOVA for High-IM females indicated a high probability ($p = .936$) that the three ability groups were the same in PA learning. Figure 5 indicates that on the first trial the High-Ability group made more errors than did the Low-Ability group. When Figures 4 and 5 are compared, the most atypical group is the High-IM, Low-Ability females, who made fewer errors than expected.

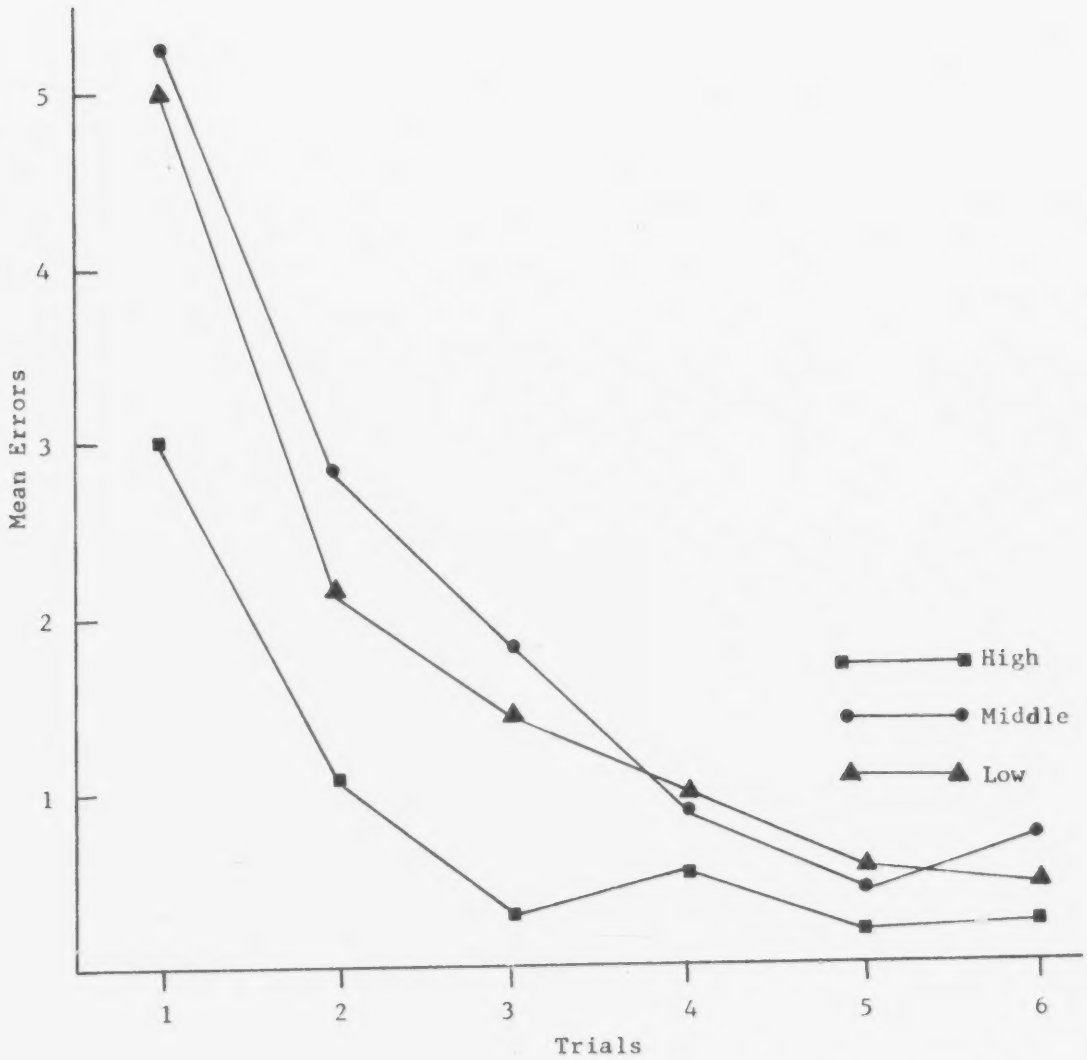

Figure 2. PA errors over trials as a function of ability levels in high-IM male subjects.

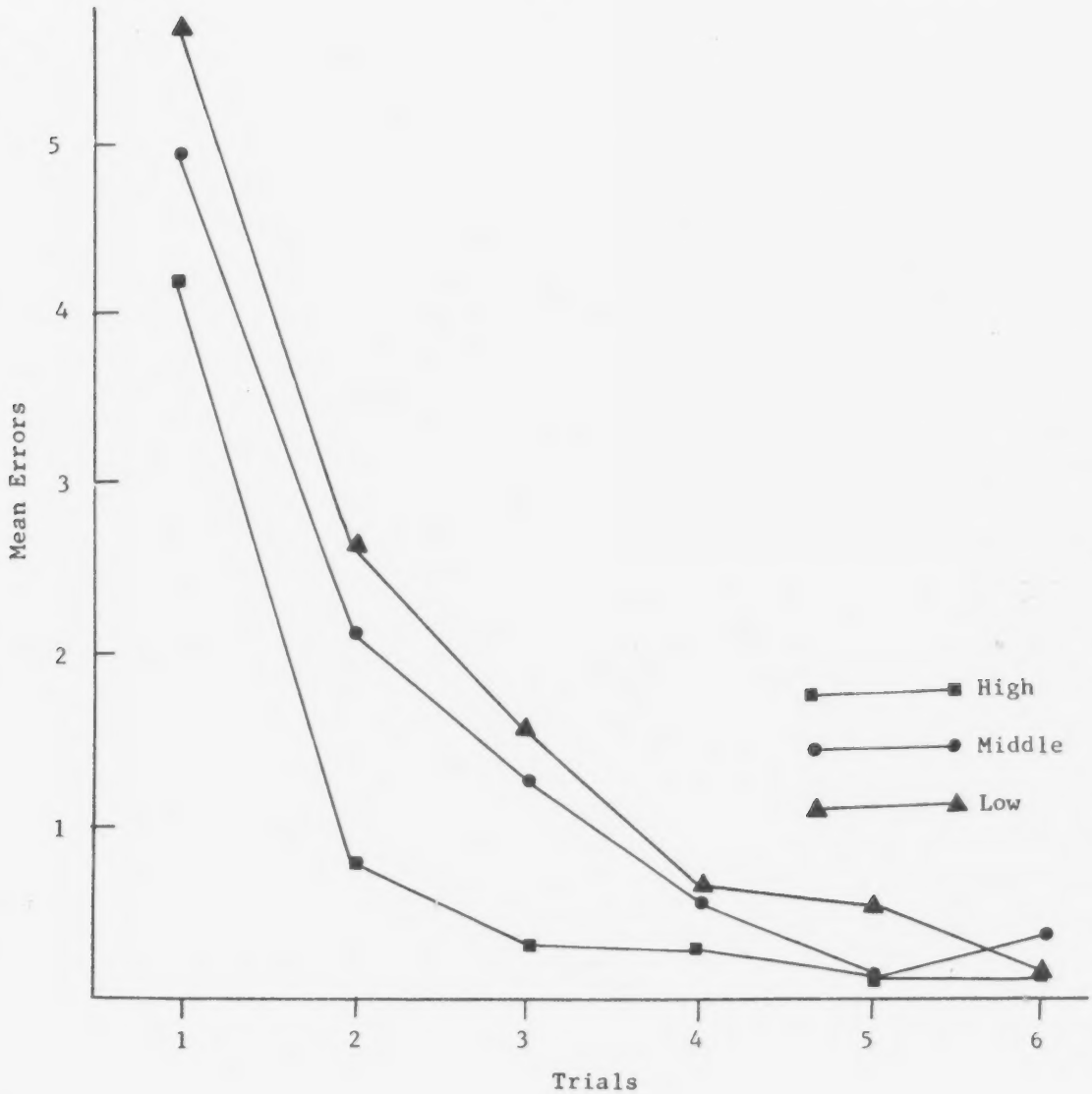

Figure 3. PA errors over trials as a function of ability levels in low-IM male subjects.

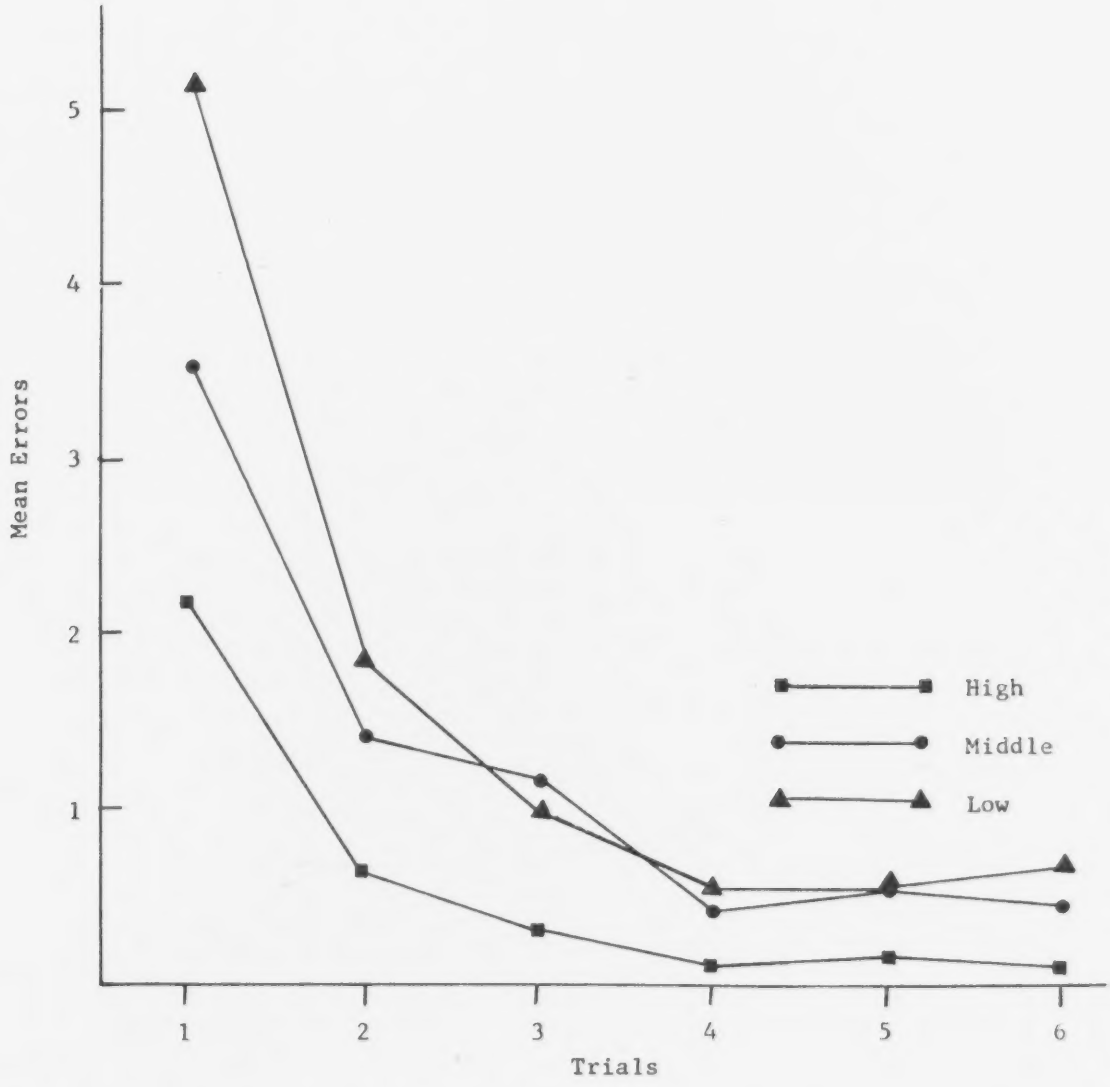

Figure 4. PA errors over trials as a function of ability levels in low-IM female subjects.

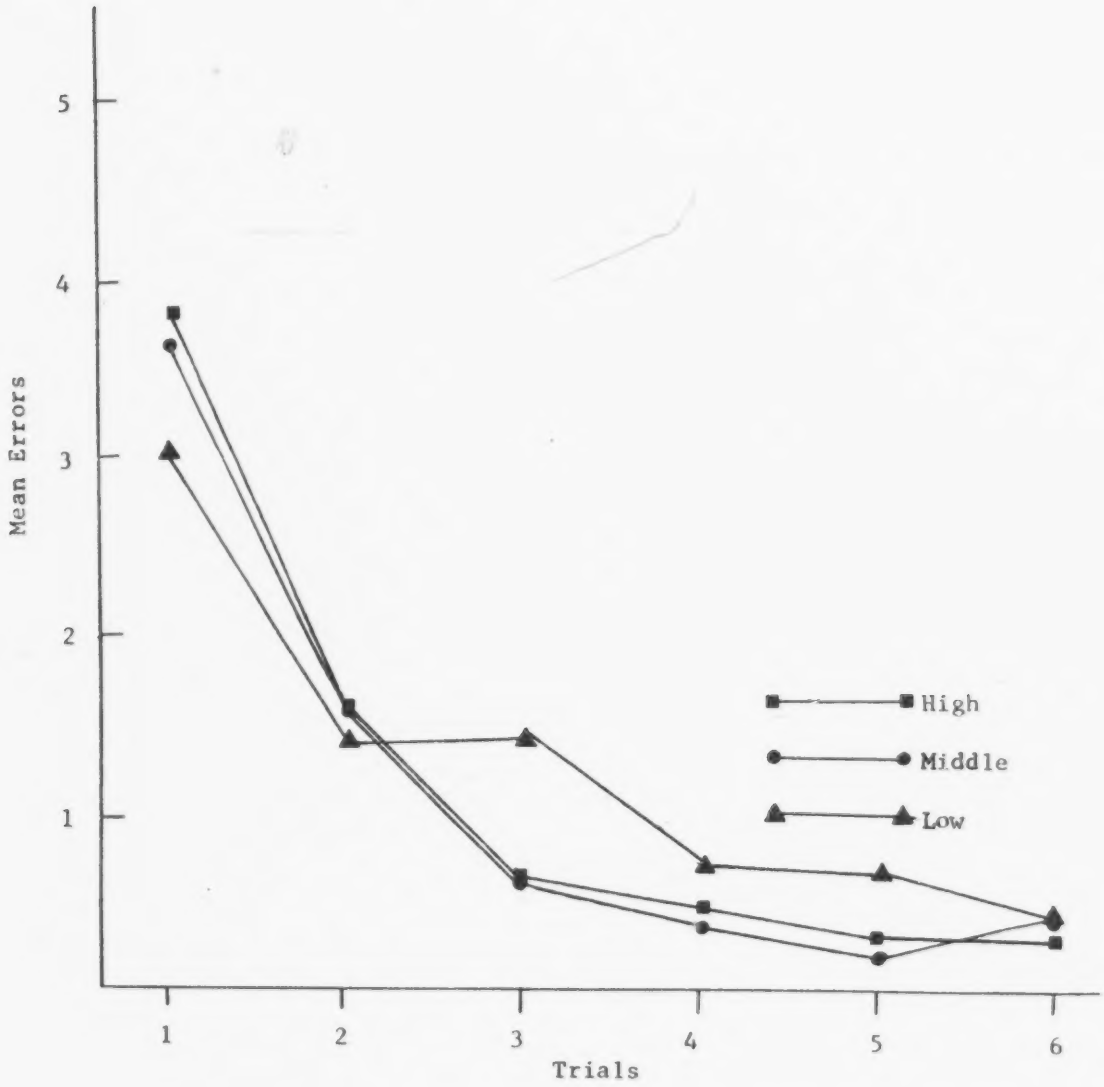

Figure 5. PA errors over trials as a function of ability levels in high-IM female subjects.

These same data were reexamined from yet another point of view. The PA error scores for High-Ability females were submitted to a two-way analysis of variance, with IM the between-groups dimension and Trials the within-groups dimension. The Trials effect was, again, highly significant ($p < .001$), and the IM x Trials interaction yielded an F-ratio of 2.449 ($p = .035$). The IM main effect was not significant ($F = 2.637$, $p = .111$). These data are plotted in Figure 6. A similar analysis for girls of middle ability yielded no significant results other than a Trials main effect. The Low-IM and High-IM groups were essentially the same. The Low-Ability female ANOVA again demonstrated the Trials effect as well as a significant ($F = 4.606$, $p < .001$) IM x Trials interaction. These data are plotted in Figure 7.

A comparison of Figures 6 and 7 demonstrates the inconsistent IM effect for Low- and High-Ability girls. The performance of Low-Ability female subjects is consonant with the theory of motivational orientation. Those High-IM subjects made fewer errors on the first two trials than did the Low-IM subjects. Trials 1 and 2 are the most variable of the trials and should reflect most clearly the differences among the various subgroups. The performance of the High-Ability female subjects is not consonant with the theory of motivational orientation. The Low-IM High-Ability females learned more quickly than any other subgroup. Although one might speculate about the undergying reasons for the inconsistent performance among the female subjects, there are no data available from the present research to explain these inconsistencies.

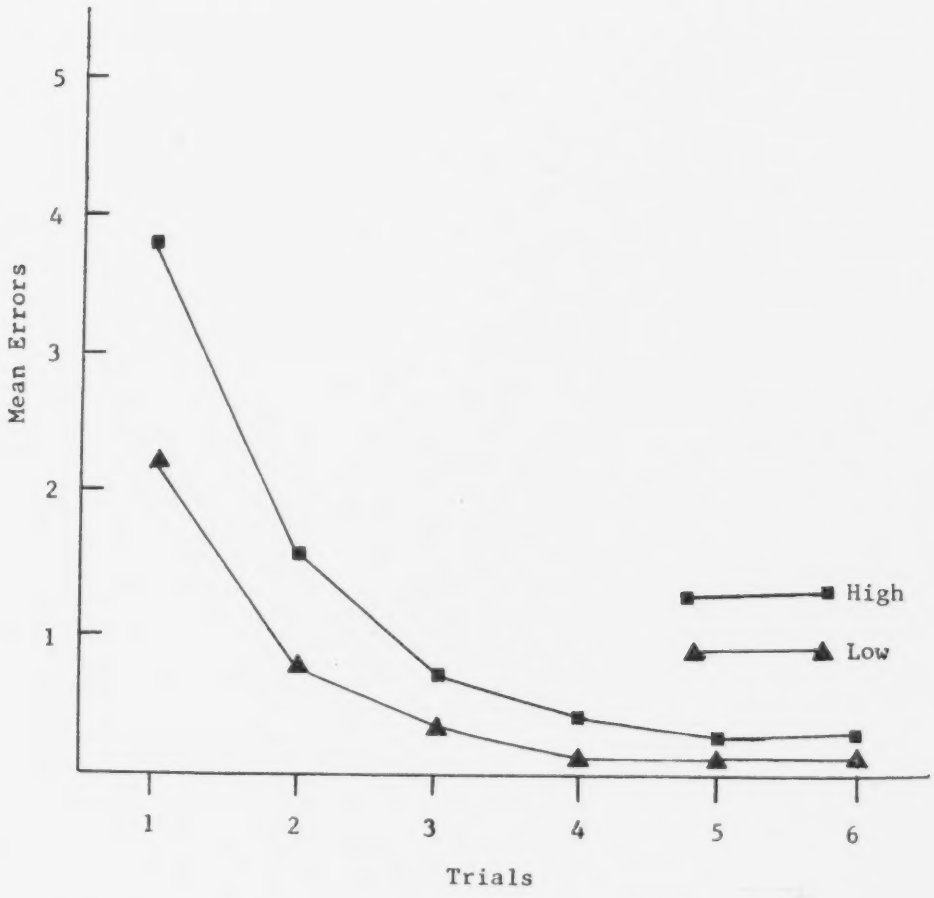

Figure 6. PA errors over trials as a function of IM level for high ability female subjects.

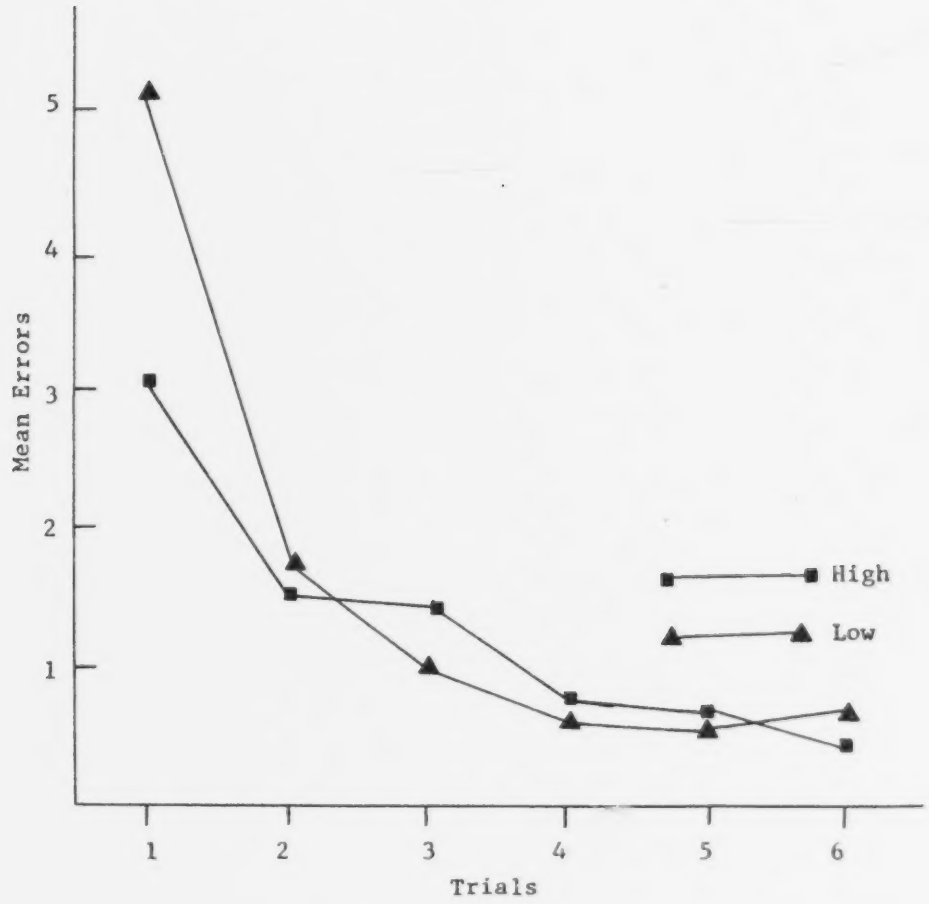

Figure 7. PA errors over trials as a function of IM level for low-ability female subjects.

SES and PA Learning

It was expected that the effect of SES would result in a significant main effect as well as contribute to significant higher order interactions. The data did not support the expectations. The SES main effect was not significant and only one significant interaction included SES as a factor. The SES x Ability interaction yielded an F-ratio of 4.444 ($p = .013$). The SES x Ability x Trials interaction was not significant. The mean PA learning errors for Middle SES High-, Middle-, and Low-Ability groups respectively were: 0.813, 1.792, and 1.370. The mean errors for the respective Low SES groups were: 0.969, 1.156, and 1.901. The significant interaction does not appear to be a meaningful one.

The expectations regarding the effect of SES on PA learning in the present study were formulated on the basis of research reported by Jensen (1961, 1968) and Rapier (1966). They found that SES accounted for much of the variability in PA learning. There are several possible explanations for the discrepancy between the results obtained by previous researchers and that obtained in the present study. The PA learning tasks were not exactly the same. Previous researchers (Jenkins, 1961; Rapier, 1966) used the more traditional, individually administered recall technique, whereas the present research used a group-administered recognition technique. The differences in results may be due to differences between recall and recognition and/or differences between individual and group administration.

The subject populations used in previous studies might be dissimilar to that used in the present study. Previous investigators (Jenkins, 1961;

Rapier, 1966) obtained their subjects from highly-populated areas in and around San Francisco, California. The present research was done in Murfreesboro, Tennessee, a small city (population 30,000) in middle Tennessee. Another difference is the method by which a subject was assigned to an SES group. Jensen (1961) avoided scaling SES by using Mexican-American children attending schools in low SES neighborhoods and middle-class white suburban children. Rapier (1966) obtained information about parents' education and employment, and assigned subjects to middle or low SES categories on the basis of that information. None of the industrial studies (e.g., Centers and Bugental, 1966) cited earlier in an attempt to relate motivation orientation to SES made any effort to scale SES. It is not certain to what degree possible methodological or population differences contributed to differences in results between earlier studies and the present research, but the difference should be noted.

Mediating Instructions and PA Learning

It was expected that instructions to mediate, by using a sentence with both stimulus elements of the word-pairs to be learned, would facilitate the learning process. The results did not support the expectation. There was no main effect for Conditions, and there were no significant interactions between Conditions and any other factor. The expectation that instructions to mediate would facilitate PA learning was based on the results of a series of studies by Jensen and his associates (Jensen & Rohwer, 1963a, 1963b, 1965; Rohwer, 1964).

They found that instructions to mediate facilitated PA learning, but did not have the same effect on serial verbal learning. Retarded subjects were helped more than were normals, and subjects in grades two through ten were aided more than were younger and older subjects.

There were several differences between Jensen's research and the present study. Jensen and Rohwer (1965) instructed subjects to form a sentence with the stimulus elements, but were able to have the subjects say the mediating sentences aloud immediately after exposure to the stimuli. They were, therefore, quite certain that mediating sentences had been formed by every subject for each stimulus pair. In the present research, the experimenter suggested that sentences be formed for each pair, but the group testing procedure made it impossible to see that mediating instructions were followed. It also did not allow the subjects to say the sentences aloud. Jensen and Rohwer (1965) used a recall technique in the study of PA learning. The facilitating effect of mediating instructions has been demonstrated only in the PA-recall method, and has never before been used with the PA-recognition technique. A factorial study using mediation and non-mediation on PA-recall as well as PA-recognition would be of considerable interest.

Sex and PA Learning

It was expected that girls would learn more quickly than would boys. Previous research (e.g., Stevenson et al., 1968; Duncanson, 1964) had indicated consistently better performance by girls on PA learning

across a rather wide age range. The results of the present research are consistent with the previous studies. A significant ($p = .04$) Sex main effect was found, as well as a Sex x Trials interaction ($p < .001$). Despite the previously discussed unusual interaction between Sex, Ability, IM, and Trials, girls consistently performed better than did boys. There were no data abailable in the present research to explain further the repeatedly observed phenomenon of female superiority in verbal learning.

Ability and PA Learning

The expectation that High-Ability subjects would learn a PA task more quickly than would Middle-Ability subjects, and that Middle-Ability subjects would perform better than Low-Ability subjects, was generally supported. The six-factor ANOVA yielded a significant ($p < .001$) Ability main effect. There were also significant interactions between Ability and SES, and between Ability and Trials. There was a three-factor unteraction, IM, Ability, and Trials, ($p = .025$) and a four-factor interaction, IM, Sex, Ability, and Trials ($p = .017$). The various subanalyses also generally supported the expectations regarding ability and PA learning. There was an exceptional group, High-IM females, who failed to perform in the expected manner. This atypical group has been discussed in a preceding section.

Results and the Theory of Motivational Orientation

The results of the present study neither confirm nor contradict the theory of motivational orientation. It would appear that IM and various other factors do interact in PA learning. These interactions

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APPENDICES

APPENDIX A

REVIEW OF THEORY AND RESEARCH ON THE MOTIVATIONAL ORIENTATION (MOTIVATOR-HYGIENE) CONSTRUCT

Review of Theory and Research on the Motivational Orientation (Motivator-Hygiene) Construct

The Motivator-Hygiene construct was developed by Herzberg, Mausner, and Snyderman (1959), who studied job satisfaction and job dissatisfaction among industrial workers. Herzberg *et al.* found that a cross-section of workers who were asked to describe periods of job satisfaction often described satisfying work situations in terms intrinsic to the tasks in which they were involved. The task intrinsic terms most often used by their subjects were the opportunity to learn, to advance, and to be responsible. These terms were subsumed under the construct "motivators." Task extrinsic terms were most often used to describe periods of job dissatisfaction. These included various sorts of bad working conditions, supervision, peer associations, and wages. Since these terms all dealt with the job environment, Herzberg *et al.* borrowed a public health term and named then the "hygiene" factors. The industrial research suggested that these constructs were orthogonal, that is, improvement of hygiene factors could decrease job dissatisfaction but not, in itself, produce job satisfaction (which, in turn, depended upon the "motivators").

The Motivator-Hygiene theory has generated considerable industrial research, which has been reviewed recently by Lawrence (1969). Of more interest to the proposed research is the application of the Motivator-Hygiene constructs to the field of mental health. Herzberg and Hamlin (1961) proposed that these two constructs might also be of value in describing emotional adjustment. The Hygiene factor might describe the need to avoid tension or unpleasantness and therefore, reflect the degree of mental illness. The Motivator factor might describe self-acceptance or

self-actualization, and thus directly reflect degree of mental health. The authors went on to suggest that an individual could be described as having met or unmet needs in each of the two dimensions and, therefore, be depicted as falling into one of four categories ranging from "mental illness" to "positive mental health."

Hamlin and Nemo (1962) developed a self-report questionnaire entitled the Choice-Motivator (C-M) Scale which provides for the quantification of motivational orientation. The Motivator factor is reflected in a score described as intrinsic motivational orientation (IM) and the Hygiene factor as extrinsic motivation (EM). When administered to improved schizophrenics, unimproved schizophrenics, and college students, the C-M Scale scores for intrinsic motivation significantly differentiated improved from unimproved schizophrenics. The extrinsic motivation scores for unimproved schizophrenics were reliably higher than those for patients classified as improved. College students' IM scores were higher, and EM scores lower, than those of either group of mental patients. Haywood and Weaver (1967) suggested a change from the original terms, motivator and hygiene, to intrinsic motivation and extrinsic motivation. This was an attempt to focus attention on personality traits as opposed to descriptions of how individuals seek reinforcement.

Sandvold (1962) used a population similar to Hamlin and Nemo's (1962). He administered a high-effort task to half of his subjects and a low-effort task to the remaining subjects. Half of each group was given goal-oriented direction, the remainder had no such instructions. Sandvold administered the Choice-Motivator Scale both before and after the tasks.

He also measured verbal productivity. Sandvold's results generally supported the theoretical framework formulated by Herzberg and Hamlin (1961). Fantz (1962) found that rehabilitation training in a hospital was more effective with motivation-oriented patients than with hygiene-oriented patients.

The research with mental patients led Herzberg and Hamlin (1963) to propose a model for psychotherapy based on the hypothesis that mental health and intrinsic motivation are related, and to suggest that psychotherapy should be a reorganization of motivation toward self-actualization and away from avoidance of psychological stress.

A series of studies at Peabody College has examined various relationships between motivational orientation and school achievement, personality traits, and learning. The first of the series (Haywood & Dobbs, 1964) involved administering the Choice-Motivator Scale and the S-R Inventory of Anxiousness (Endler, Hunt, & Rosenstein, 1962) to 100 eleventh and twelfth grade boys in two schools, one of middle socioeconomic status (SES) and one lower SES. Lower SES subjects had higher manifest anxiety scores and higher scores on the avoidance factor on the S-R inventory. Subjects who scored in the highest quartile of the IM distribution tended significantly to approach tension-inducing situations (S-R Inventory), while subjects in the highest quartile of the EM distribution tended significantly to avoid tension-inducing situations.

Haywood and Weaver (1967) administered the C-M Scale to 160 institutionalized mental retardates. The design was to compare subjects with

high IM scores to subjects with high EM scores on a simple motor task. To group subjects they used a difference score technique (IM minus EM); however, only 15 of 160 subjects earned positive difference scores. Later studies have supported their observation that institutionalized retardates tend to produce more EM than IM responses on the C-M Scale. Haywood and Weaver did establish two groups differing in motivational orientation by selecting the 40 subjects with the highest EM scores and the 40 subjects with the highest IM scores. The latter group, while called the IM group, was depicted as being "relatively less EM." Subjects were assigned to one of four incentive conditions: promise of another more interesting task, a one-cent reward, a ten-cent reward, and a control group not promised any reward or task. The IM subjects performed best when the reward was promise of another task, and less well when promised a ten-cent reward. The EM subjects worked harder for the ten-cent reward than they did for the task incentive. The EM score for all subjects correlated significantly and positively with length of institutionalization, chronological age, and mental age.

Haywood (1968a, 1968b) has examined possible relationships between several other personality variables and motivational orientation. The first study (Haywood, 1968a) used the vertical rod and frame test of field dependence. Retardates institutionalized in Ontario, Canada, were divided into low IQ (35 - 60) and high IQ (61 - 90) groups, and also were divided into IM and EM groups. High IQ subjects made fewer errors, and IM subjects made fewer errors; however, the distribution was atypical because of the unusual performance of the high IQ-EM subjects.

A second part of the study was conducted in Tennessee where all subjects were given the Children's Embedded Figures Test and the rod and frame procedure. There was no motivational effect, but there was a large practice effect over trials.

In another study, Haywood (1968b) used the Junior Eysenck Personality Inventory, Iowa Pictures Test, C-M Scale, and group IQ tests as predictors of scores on the Metropolitan Achievement Tests in reading, spelling, and arithmetic. The personality tests and IQ tests used together predicted achievement better than the IQ tests alone at each of the three grade levels (second, fourth, and sixth), with one classroom at each grade level representing intellectually superior, average, and mentally retarded groups.

There have been a number of studies relating motivational orientation to academic achievement. These studies have included elementary school children (Haywood, 1968b, 1968c), junior high school retarded children (Dobbs, 1967; Wooldridge, 1966), and college students (Kahoe, 1966). These studies often categorized subjects on the basis of IQ, and have included the mentally retarded, as well as children of dull normal, average, and superior intellect. Summarizing these studies, Haywood (1968c) has reported that individual differences in motivational orientation account for little variation in achievement scores beyond that variance accounted for by IQ, among intellectually superior subjects, while among the intellectually average MO accounts for some 10 percent of the variance, and for the educable mentally retarded MO accounts for 30 percent. Among the latter group, IM children are found to be achieving one to two years

ahead of a matched EM group, when compared on standard tests of school achievement.

A thorough search of the literature has yielded only three studies in which motivational orientation was an independent variable and a laboratory learning task was the dependent variable. In the first of these, Haywood and Wachs (1966) used adolescent subjects of average IQ (mean IQ of 105) and adolescents with below average IQ's (mean IQ of 76). Subjects were selected for high intrinsic or high extrinsic orientations on the basis of C-M scores. The learning task was a visual size-discrimination problem with form and position irrelevant. The correct size, either small or large, was counterbalanced for each group. A task effort, pressing on a pedal with the foot, was controlled by the experimenter to be either relevant or irrelevant to the discrimination learning task. Each subject was given massed trials to a criterion on two successive days. After achieving criterion the correct size was reversed and the subject was run to a criterion in the reversal procedure. In the low-IQ group IM subjects took fewer trials to learn than did EM subjects. Task effort or relevance did not affect acquisition scores. With acquisition scores adjusted by a covariance technique, EM subjects solved reversal more quickly than did IM subjects. Among the subjects with average intelligence there was no difference in acquisition between the IM and EM's, and again there was no significant effect of task effort or task relevance. There was a difference between groups in speed of learning to criterion on day two with IMs significantly faster than EM subjects. The reversal effects found in the lower IQ

group did not occur in the average IQ subjects. The data for all groups suggested that IM subjects learned more quickly than did EM subjects with one exception, the previously noted low IQ-IM reversal phenomenon. It should be noted that this study was carried out at a residential center that trains adolescents who are almost exclusively from low socioeconomic, culturally deprived families.

Wachs (1968) continued the study of the effects of directional-motivation orientation on laboratory learning tasks by using a free-recall verbal learning procedure with a public school population. His subjects were a sample of fourth, eighth, and twelfth grade students from the Pittsburgh City School System. Group IQ tests allowed subjects to be placed into one of three IQ levels: EMR, average, and superior. On the basis of C-M scores, subjects were categorized as IM, mixed, or EM. The free-recall task involved giving subjects a list of 50 nouns of 3, 4, or 5 letters to learn. The words were presented to subjects by means of a tape recording, then a test of retention was administered. There were five learning-testing trials on one day, and a retention trial the following day. Data were words recalled on each trial and on retention. The overall analysis of variance yielded no significant fourth order or third order interactions; however, the second order within groups interactions were significant including the motivation by trials effect. On simpler analysis the CA by trials interaction proved significant, with older students showing better recall. The IQ by trials interaction proved nonsignificant on the first trial, but significant for trials 2 through 5. In the motivation by trials analysis the IM

and mixed groups were not different, but were superior to the EM group. This difference increased over trials. There data are not surprising in light of Jensen's (1968) contention that free-recall learning is relatively culture-free and, therefore, less effected by motivational variables.

A study (Haywood, Heal, Lucker, Mankinen, & Haywood, in press) of institutionalized retardates' performance on a visual paired-associates learning test also considered the effects of motivational orientation on learning. The subjects were grouped into three IQ levels (40 - 49, 55 - 64, 70 - 79), were given the C-M Scale, and were divided into a passive-visual study procedure and a visual-motor procedure. The latter group were required to make a motor response in the presence of the stimulus-response pair, while the passive group learned in the more usual paired-associates (PA) technique. Retention tests were given to all subjects immediately following learning and they were assigned to groups to be retested 1, 2, 4, or 8 weeks following learning. After adjustment for original learning, the IQ groups did not differ in retention scores. The visual-motor method of presentation resulted in fewer errors in the middle IQ group, but had no effect on the low and high IQ groups. The motivational effects were not significant.

A recent dissertation study by Kuykendall (1969) examined the differential effects of task effort, IQ, and motivational orientation on the identification of visually presented concepts. Her subjects were sixth grade students from predominantly upper-middle SES suburban communities. The criterion task was the identification of the concept <u>two</u>

presented visually under low-difficulty and high-difficulty conditions. The low-difficulty condition was described as two black squares on a white background with negative stimuli in the form of similar black squares placed randomly on the same background in numbers one, three, or four. The high-difficulty condition was two geometric forms varying in shape and color with negative stimuli of the same shape and color placed randomly as in the low-difficulty condition. She divided subjects into three motivation groups: IM, MM (a mixed motivation or middle group), and EM. Kuykendall found in an analysis of error scores that motivation and task difficulty interacted significantly ($p < .05$) with only EM subjects increasing in number of errors as task difficulty increased. For low difficulty tasks there were no differences among the motivation groups. For high difficulty tasks the MM group performed significantly better than either the IM or EM groups.

The results of these studies are not sufficient to warrant the conclusion that motivational orientation is a primary factor in accounting for individual differences in laboratory learning tasks. Neither can one conclude that MO has little value in predicting laboratory learning. It is this writer's contention that subject selection and/or failure to control for socioeconomic status (SES) has contributed significantly to the ambiguous results reported in these learning studies. Jensen (1968) has presented a strong case for the control of SES in studying learning in children. The Haywood and Wachs (1968) study used a subject population composed almost entirely of adolescents from culturally deprived, low SES homes. Haywood *et al.* (1968) studied a population

institutionalized at a state hospital for the mentally retarded. Sarason and Gladwin (1958) contended that many of the mentally retarded are from the most socially and economically deprived families. Although Wachs (1968) probably employed a heterogeneous subject population he, too, failed to control for the effects of SES.

There has been both direct and indirect evidence in the expanding literature to suggest that SES and motivational orientation are related. There are at least five industrial studies of Herzberg's theory that specifically considered occupational level. Malinovsky and Barry (1965) administered a 40-item work attitude survey to 117 blue-collar workers. While attitudes were separable into two relatively independent components, both components were positively related to job satisfaction. Centers and Bugenthal (1966) interviewed a large cross section of the working population in still another test of Herzberg's theory. They found that in higher occupational levels intrinsic factors were important for job satisfaction. Workers in the lower end of the job continuum, however, valued extrinsic factors such as pay and security. Friedlander (1966) found no significant relationships between either intrinsic motivation or extrinsic motivation and job satisfactions in a blue collar sample. In white collar workers intrinsic motivation was not related to job success, but low job performers were motivated primarily by the social environment of the job. Champagne and King (1967) examined job motivation in underprivileged workers by presenting 16 motivational items in a paired comparison technique. Their analysis of the data took into consideration race, sex, and place of residence. Their

results suggest intrinsic, personal factors are more important than the job context. Bloom and Barry (1967) examined the job motivation attitudes of 85 Negro blue-collar workers. Their data indicate hygiene or environmental factors are more important to Negroes than they are to white populations. They question the effectiveness of Herzberg's two factor theory when Negro or low status workers are considered.

The industrial studies cited would suggest that the Motivator-Hygiene dimensions proposed by Herzberg may have greater predictive validity in higher status occupational groups than in lower status occupations. Since occupation and SES are closely related, it may be argued that intrinsic motivation is less prevalent in low SES than in middle and upper SES. The industrial studies included only adult subjects. It would seem reasonable to assume that children would tend to reflect the motivational orientation of the significant adults in their life. There is some evidence to support this assumption.

Weaver (1966) studied the effects of social reinforcers, behavior in a persistence task, and behavior in an interpersonal task in a culturally deprived elementary school population. He had hoped to have a group of intrinsically motivated subjects and a group of extrinsically motivated subjects; however, the population he tested yielded few, if any, high intrinsic subjects. Weaver felt his population was a typical young, culturally deprived group in terms of motivational orientation. Wooldridge (1966) predicted differences in academic achievement when his sample of children of subnormal IQ were divided into groups designated intrinsically motivated (IM) and extrinsically motivated (EM). His

subjects (N=72) ranged in age from 12 to 17 and in IQ between 50 and 89. They were divided into two IQ groups: EMR's (IQ's 55 - 77) and dull normals (IQ's 78 - 89). When all subjects were cast into one of four groups on the basis of IQ and motivational orientation, Wooldridge found no significant differences between groups in CA, IQ, MA, sex, and race. He did find the SES effect significant. Wooldridge had described his subjec' s low or middle SES on the basis of school attended. Wooldridge also found that IM subjects surpassed EM subjects in academic achievement at each IQ level.

Call (1968) studied motivational orientation as a function of SES, school grade, race, and sex. He found that high SES subjects were significantly more intrinsically motivated than were low SES subjects, and males tended to be more IM than females. Intrinsic motivation was more strongly related to SES and grade than to race or sex.

APPENDIX B

INDIVIDUAL DIFFERENCES AND PA LEARNING IN CHILDREN

Individual Differences and PA Learning in Children

The present research was directed toward an examination of the effects on PA learning of some factors that might be described as individual difference variables. The study was not designed to make a direct contribution to the theory of PA learning. This review of the literature is therefore directed toward an examination of those studies in PA learning that included children as subjects, and that were concerned with the varying effects of measurable individual differences. Extensive examinations of PA learning have already appeared (e.g., Battig, 1968; Underwood, 1966). There are two detailed reviews of verbal learning in children (Goulet, 1968a; Keppel, 1964). The present review will briefly describe PA learning procedures and review the literature relating PA learning to ability and to motivation.

PA Learning: A Description

A PA learning task involves the presentation of a list of pairs of units so that the subject can recall, recognize, or anticipate the second part of the unit-pair when the first part is given alone (Underwood, 1966). The list is usually presented several times with a measure of performance on each trial. Responses may be obtained orally, in written form, or selected from lists of possible correct answers. The stimuli may be presented for aural or visual reception. There are three basic procedures that may be used with a variety of possible apparati.

Alternate study and recall is not the most commonly used procedure.

A study trial is the simultaneous presentation of both stimuli of a unit-pair for a period of time, all pairs presented in a predetermined sequence. Following the study trial, a test trial is administered in which the subject is exposed to the first half of each unit-pair and is asked to recall the missing element. Study trials and test trials are alternated, either to a specified criterion or to a predetermined number of trials.

The anticipation method combines the study and test trials after the first study trial. Subjects are presented lists that contain the first half of each unit-pair followed by the entire unit-pair. The anticipation method prevides immediate feedback, but does not separate the learning and the recall processes.

The recognition method is basically similar to the alternate study and recall method, differing only in the subject's mode of response. Instead of an oral or written recall, the recognition method allows subjects to select the correct missing response item from a pool of possible response items. Although studies have compared children's performances among various learning tasks (e.g., Stevenson, et al., 1968), this writer has not been able to find a direct comparison of the various PA learning tasks.

Ability and PA Learning

There are two distinct sorts of studies that have related measures of ability to PA learning. There is a growing literature that compares the performance of the mentally retarded (MR) to the non-retarded. In

general, these studies compare the learning performances of subjects at differing levels of ability, using more-or-less discrete categories of ability. There is a smaller group of studies that have used primarily normal subjects, and have correlated PA performance with scores on ability measures.

The studies comparing retardates to normals on PA learning have been reviewed extensively (Denny, 1964; Lipman, 1963; Prehm, 1966; Zeaman & House, 1967). In general, the research comparing the MR - Non-MR learning processes has involved matching subjects on mental age (MA) or chronological age (CA). These matching procedures have resulted in considerable methodological problems (Prehm, 1966). The sorts of materials used in studies involving MR subjects must, necessarily, be relatively simple and often highly meaningful. This, too, reduces the generalizability of results. Zeaman and House (1967) observed that the greater the difference in average IQ or average MA, the greater the probability that population differences will be shown. They maintained that CA is not relevant to learning, and that with small or moderate IQ differences between populations the deleterious effects of lower IQ can be explained by attentional or memory deficits of the low-IQ subjects.

Of greater interest to the present review are several studies that have used subjects in the average and above-average range of intelligence. They are more extensively described because they have examined several factors pertinent to the present research. Stake (1961) administered 12 learning tasks to 240 seventh-grade subjects, varying content of task (verbal vs. nonverbal), type of task (rote vs. relational), and mode of

presentation (group vs. individual game-like tests). The data led Stake to conclude that there was no evidence for a general learning factor. The PA methodology was used with both verbal and nonverbal stimuli. The correlation between verbal paired-associates and Otis IQ was higher than the median correlation for all learning tasks and Otis IQ. There were significant positive correlations between PA and Stanford Achievement Test scores, and between PA and grades in all five courses in which students were enrolled. Duncanson (1964) employed 102 sixth-grade subjects to study relationships among various learning tasks. He used three types of tasks (rote memory, PA, and concept formation), with three kinds of material (verbal, numerical, and figural) in each task. Among the correlations between the various learning tasks and Kuhlman-Anderson IQ, the PA (verbal) correlation was highest at .43. Only two learning tasks, verbal PA and verbal rote memory, yielded consistently high correlations with all the subtests of the Stanford Achievement Tast (r =.36 to .60). Duncanson's analysis involved breaking each learning curve down into a series of component curves. Among the tasks, rote memory and PA tasks were most consistently significantly related, with little significant relationship between concept formation and PA tasks.

Stevenson and Odom (1965b) administed five learning tasks to 354 children in grades four and five. The purpose of the study was to examine the interrelations between various learning tasks, and to relate learning to ability and other factors. A PA learning task of the recognition type was used, together with concrete and abstract discriminations,

a concept formation task, and anagrams. An analysis of variance for the PA learning data yielded significant main effects for age and sex and no significant interaction. Girls learned more efficiently than boys, and sixth graders were superior to fourth graders. The California Test of Mental Maturity was administered, and significant correlations were reported between PA learning and MA, IQ (Language), and IQ (Non-Language) for both sexes at both grade levels. A description of the occupation of the fathers of the subjects was scaled, and the scale score correlated with PA learning. The occupation-PA correlations were significant for all but the sixth-grade female subjects. The PA and anagrams tasks correlated highly with each other, but did not correlate highly with the other learning tasks.

In following up his previous work, Stevenson and his associates (Stevenson, Hale, Klein, & Miller, 1968) examined various interrelations and correlates in children's learning and problem solving. Their subjects were bright, average, and dull (special class EMRs) seventh-grade boys and girls in one study, and third, fourth, fifth, sixth, and seventh-grade students in another study. A series of learning and problem-solving tasks was presented on film to the subjects over several days. Among the tasks were two PA procedures of the recognition type, discrimination learning tasks, probability learning, incidental learning, verbal memory, concept formation tasks, and several problem-solving tasks. In all, 12 different procedures were used. In addition to correlating performance on the various tasks, the study also examined the following relationships: task-IQ, task-achievement test performance,

task-school grades, and task-teachers' ratings of students' classroom behavior (e.g., effective learner, hardworking, socially dependent, and enthusiasm). All of the data were analyzed separately for boys and girls, and frequently there were significant differences between them. The two PA tasks were highly correlated for both boys and girls (r =.60 and .64). Not all the IQ-task (by groups) correlations were reported, but the PA-IQ correlations were among the highest and were significant. Correlations between tasks and performance on the Iowa Tests of Basic Skills were consistently significant for five of the twelve tasks and, in general, the highest correlations obtained were PA-achievement scores. Stevenson, et al., noted that the correlations between three of the tasks and grades were unusually high. Most remarkable were the PA-grades correlations. For boys, PA-grades correlations were as high or higher than the IQ-grades correlations. The effect was less strong for girls. PA correlated significantly with grades, among the boys, even after the effects of IQ had been partialled out. This effect was not significant for the girls. Although the teachers' ratings-task correlations were highly complex, the PA tasks were often significantly correlated with the ratings. The developmental study yielded similar results. The data indicated a strong developmental effect on PA learning, but the sixth- and seventh-grade students did not differ significantly.

The research reviewed was consistent in finding positive correlations between measures of ability and PA learning. The present research was designed not to replicate these findings, but rather to control the

effects of ability while examining other variables, including motivation.

Motivation and PA Learning

There are a relatively large number of studies, using college students or other adult subjects, that relate motivational variables to PA learning. Most of these have attempted to relate anxiety to PA learning. Goulet (1968b) extensively reviewed this literature. Other variables related to PA learning are need-achievement (Weiner, 1966), insecurity, blandness, or hostility (Chubb & Barch, 1960), and rigidity (Polan, 1955). Only three studies have been found that have used children as subjects while examining the effects of motivational variables on PA learning.

Waite, Sarason, Lighthall, and Davidson (1958) examined the effects of anxiety level on PA learning. Their subjects were 211 pairs of children matched on sex, age, and IQ in grades two through five. Children lower in anxiety as measured on the Test Anxiety Scale for Children (TASC) exhibited significantly better PA learning than did subjects higher in anxiety. They found no significant interaction between anxiety and CA on PA learning.

Stevenson and Odom (1965) also used the TASC to measure anxiety level in their fourth- and sixth-grade subjects. The TASC also included a Lie Scale that attempted to measure defensiveness of the individual against the admission of experiencing anxiety. All subjects were given five learning tasks including a PA-recognition task. Boys' and

girls' anxiety scores were not different at grade four, but at grade six, girls had significantly higher anxiety scores than did boys. At both grades, boys had significantly higher defensiveness scores. For all subjects, defensiveness correlated significantly and negatively with anxiety. After partialling out the effects of defensiveness, anxiety was correlated with learning performance, ability, and demographic variables. There was a significant negative correlation for boys between anxiety and PA learning at both grade levels. The same correlations for girls were negative but did not reach significance. None of the other learning tasks yielded such consistent effects. The PA data were submitted to ANOVA with sex, grade, anxiety, and defensiveness as between-groups dimensions (i.e., subjects were grouped as high or low in anxiety and defensiveness). There were significant interactions between anxiety, grade, and defensiveness, and for grade by defensiveness. There were significant grade and anxiety main effects. There was no sex main effect. The authors did not report simple analyses, nor did they provide suffieient information to compare the PA learning for boys and girls.

The remaining study was the Haywood, et al. (in press) study described in Appendix A. They examined the effects of motivational orientation on a visual PA learning task. Their subjects were institutionalized retardates grouped by IQ level. No motivational effects were found to be significant.

The lack of research relating PA learning to motivational variables among children discourages generalizations. The positive results

reported by Waite, et al. (1958) and by Stevenson and Odom (1965), as well as the research with adults, would suggest that the PA technique will prove to be a valuable tool in the study of motivation in children.

APPENDIX C

INSTRUCTIONS TO SUBJECTS

Instructions to Subjects Used in the Administration
of the Choice-Motivator Scale

After filling in the identifying information on the C-M Scale, all subjects were read the following instructions:

1. Each item on this scale consists of two things that you might be or do. In each item underline the one you would rather do if you had to be one or the other. Assume that you are able to do anything that you want to do.
2. The list at the top of the page contains ten reasons that might explain why you chose one activity over another. After underlining your choice on each item, look at the ten possible reasons for preferring one activity or vocation more than the other. Locate the reason for your choice (or the reason that is closest to your own reason). Write down the number of that reason (1 to 10) in the space under each item.
3. As an example we will take the first item. You read that the item asks you which you would rather become: a librarian or a dentist. After you have decided, underline your choice.

   Now ask yourself: "why did I want to be the one I chose to be more than I wanted to be the other." Look up at the ten possible reasons and find the one that best explains why you chose to be the one that you underlined more than the other. Write down the number of the reason in the space below the item.
4. Any of the reasons at the top of the page can be used more than once if you wish. You do not have to find a different reason for each item, but there must be only one reason for each item.
5. Go on to the remaining items. Work quickly without worrying about each item.

Instructions to Subjects Used in the Administration
of the Job Interest Questionnaire

After fill in the identifying information on their copies of the Job Interest Questionnaire, all subjects were read the following instructions:

Now we want to get some information about the job that you want to have when you finish school. Please write your name clearly at the top of the page. We will fill in this questionnaire together. I will go over each item with you so that I can answer any questions you may have about it. Please do not go on to the next question until the whole class is ready.

(READ 1. ANSWER ANY QUESTIONS THE STUDENTS MAY HAVE.)

(READ 2.) Draw a line under the phrase that tells how far you plan to go in school.

(READ 3.) If you are not sure, then guess. Put down what you think they want you to do.

(READ 4.) Draw a line under the phrase that tells how far your parents want you to go in school. If you're not absolutely sure, then put what you think they want you to do.

(READ 5.)

(READ 6, PARTS 1 AND 2.) Write the title of your father's job if you know it. He might be a mechanix, farmer, lawyer, teacher, soldier, etc. Then write some of the things he does on his job. He might drive a truck, sell shoes, teach history, or help build houses.

(READ 6, PART 3.) Most people do work for someone else. Some examples of people who might have their own business would be a person who owns a store or a filling station; a farmer who owns his own farm; or a doctor or lawyer in private practice.

(READ 7.) This includes part-time jobs as well as full-time jobs. It can be work that she does outside the home or work that she does at home, such as baby-sitting, typing, ironing, etc. Any job that she does that she gets paid for.

(READ 8.)

(READ 9.) This means regular attendance at nursery school or kindergarten, not just visiting or going for a week or two.

(READ 10.) If adults are there at supper time and you talk with them, check yes. If adults are not there or if you do not get to talk with them at supper, check no.

(READ 11.) Do not include brothers or sisters who are now away in the service or living away at school.

(READ 12.) This includes your parents and any other person over 18 who lives with you more than half the time.

(READ 13.) This does not include closets, utility rooms, or storage rooms, but it does include garages or attics if they are used as rooms.

(READ 14.) Draw a line under as many of these things as you expect

to do next week. If you aren't absolutely sure, but you think you will do something, underline it. You may underline all of them if you think you will be doing all the things listed.

(READ 15.) We need information about your parents' education. Draw a line under the phrase that tells how far your father went in school.

(READ 16.) Draw a line under the phrase that tells how far your mother went in school.

Instructions to Subjects Used in the Administration
of the Paired-Associates Learning Task

The following instructions were read to all subjects in the administration of the PA learning task:

We are here to complete the study we began earlier in the school year. You may remember that earlier we asked you about jobs - the kind of job you wanted to have and also what your parents expected you to do when you finish school. We gave you some sheets of paper with pairs of jobs listed and asked you to tell us which of the jobs you would rather have and why. Some of you were absent that day, and some of you did not have permission slips signed by your parents. Those of you who were absent or who did not take part for some other reason, and those who did not have parents' permission, please hold up your hand now. Those of you who are not taking part in this study are now excused to go to the library. Please return to this classroom in one hour.

Please clear off your desks and get out a pencil. We are going to pass out some booklets, face down. Please do not open them or look inside them.

We are trying to learn more about how words and language are learned. This is not an IQ test and it is not a test that will count in your grades, but it is very important that you follow directions carefully. Do not open the booklets we have passed out to you until I tell you to do so. Please do not talk with other students until we are completely finished. If you have any questions, raise your hand and one of us will try to answer your question.

First of all turn the booklet over and fill in the spaces on the front. Print your name . . . your homeroom teacher's name . . . your age today . . . and your birthday. In the lower middle of your booklet (INDICATE) print in large letters _____. (A code number which indicated experimental condition was dictated).

We are trying to find out how fast seventh and eigth grade students can learn things that go together. By using the projector we will show you some pairs of words; that is, two words at a time. Your job is to remember all the words that go together. There are ten word pairs in all. You will have a number of chances to see the words. We will test your memory. While we are showing you the words you will have to pay close attention to the screen because the words will be shown only for a brief time. Is there anyone who has poor eyesight? (IF SO, WRITE PE ON THE FRONT OF THE BOOKLET.)

The following instructions were given to the subjects in the Non-Mediation group:

The word pairs are like: COW-HAT. Your job is to remember COW and

HAT go together. . . . Let's look at them now.

The following instructions were given to the subjects in the Mediation group:

The word pairs are like COW-HAT. Your job is to remember COW and HAT go to gether. They may be easier to remember if you make up a sentence with them. For example, you could say "The COW is wearing a HAT." Try to remember the word pairs by making a short sentence with both words. Let's look at them now.

SHOW WORDS HERE. (Projector operator rearranges slides after showing and then helps proctor.)

We will check your memory by using these booklets. Don't open them yet. When they are opened you will find a column of words on the left. Across from each of these words is a row of words. You are to circle the word on the right that goes with the word on the left. If you are not sure, guess. You will have another chance later to see the word pairs projected.

When you are finished, cover up your work and do not go back over it. Do the words in order.

There are blue sheets in front of the answer sheets. These are to cover your work so no one else can see it. Do not look at anyone else's answers. Look at the front of the room when you have finished.

Now open your booklet. Fold back the top sheet and crease it. (DEMONSTRATE.) Fold back the blue sheet and crease it. (DEMONSTRATE.) Bend the blue sheet around to cover your work as you go along. Circle the word that goes with KING; then go on and keep your work covered.

Remember, guess if you aren't sure, and do not go back over your answers when you've finished. Keep them covered.

The following instructions were given for trials 2 through 6:

We will now show you the word pairs again. Pay close attention while we project them so that you will be able to remember them.

PROJECT NEW SEQUENCE OF SLIDES EACH TIME; REARRANGE SLIDES AFTER EACH SHOWING.

Now fold the blue sheet as you did before so it can cover up your work. Guess if you aren't sure, and don't go back over the answers when you are through.

APPENDIX D

THE CHOICE-MOTIVATOR SCALE

Choice-Motivator Scale
(Revised Form NP)

Reasons for making choices: *

1. I could learn more.
2. It would be easier.
3. I would have more money.
4. It would be safer or healthier.
5. I like to be in charge.
6. People would have more respect for me.
7. I like excitement and adventure.
8. I like to do hard things.
9. I like beautiful things and places.
10. I have done it before.

* Reasons 1, 5, 7, 8, and 9 are scored IM.

1. a. librarian b. dentist

   Why?

2. a. President b. movie star

   Why?

3. a. florist b. Navy officer

   Why?

4. a. mountain climber b. baby sitter

   Why?

5. a. student b. teacher

   Why?

6. a. play golf b. work a jigsaw puzzle

   Why?

19. a. photographer b. keep bees

Why?

20. a. ride a bicycle b. read a book

Why?

APPENDIX E

JOB INTEREST QUESTIONNAIRE

Job Interest Questionnaire

1. What kind of job do you hope to have when you are 25 years old?

_____

2. How far do you plan to go in school? (A) until you are 16 (B) finish high school (C) some college (D) finish college (E) finish college and have some graduate level training?

3. What kind of job do you think your parents want you to have when you are 25? _____

4. How far do you think your parents want you to go in school? (A) untill you are 16 (B) finish high school (C) some college (D) finish college (E) finish college and have some graduate level training?

5. Does your father (or stepfather) live at home with you? Yes___ No___

6. What is the title of your father's job? _____

What are some of the things he does on his job? _____

_____

Does he have his own business or work for someone else? _____

_____

7. Does your mother have a paid job (in addition to being a housewife)? Yes___ No___

8. Describe your mother's job. _____

_____

9. Did you go to kindergarten or nursery school before you started to first grade? Yes___ No___

10. Do you usually get a chance to talk with your parents or other adults at supper or dinner? Yes___ No___

11. How many people under 18 years of age live with you (including yourself)? _____

12. How many people 18 years or older live with you? _____

13. How many rooms are there in your house or apartment including bathroom, kitchen, etc., but not including hallways? _____

14. During the next week do you expect to do any of the following: (A) visit relatives (B) go to a movie (C) go to the public library (D) travel out of town (E) read a book that has nothing to do with school?

15. How far did your father go in school? (A) until he was 16 (B) finished high school (C) had some college (D) finished college (E) finished college and had some graduate level training

16. How far did your mother go in school? (A) until she was 16 (B) finished high school (C) had some college (D) finished college (E) finished college and had some graduate level training.

APPENDIX F

INSTRUCTIONS TO JUDGES SCORING JOB INTEREST QUESTIONNAIRE FOR SES GROUPINGS

Instructions to Judges Scoring Job Interest Questionnaire for SES Groupings

The following instructions were given to the judges as a guideline for their assignment of subjects to an SES classification.

All subjects are to be assigned to one of two SES groupings: Group I indicates lower socio-economic status and Group II indicates middle and upper socio-economic status.

The assignment of a subject to an SES group is to be made on the basis of the Job Interest Information Questionaire. This judgement is to be made on the basis of all the information available on the questionnaire. Occasionally you will encounter information that obviously is in error, i.e., when the father's occupation is listed as janitor yet the child states that the father has completed college and has graduate training. In cases such as these the estimate should be based on the greatest amount of information.

The parents' occupation is the best single estimate of SES; the parents' education is the next best predictor; residential information is next; and cultural activities should be given least emphasis.

The following is a general guideline to be followed. Remember the assignment to Group I or Group II is to be made on the overall quality information, not on just one or two items.

Group I	Group II
Low SES	Middle SES
Parents' Education	
a. Less than high school	a. Some college
b. High school graduate	b. College graduate
	c. Graduate training or above
Parents' Occupation	
a. Unskilled	a. Skilled, technical, supervisory
b. Semi-skilled	b. Professional
c. Unemployed and apparently unskilled	c. Executive
	d. Proprietor; owns medium or large business
d. Small farm or farm employee	

e. Untrained sales personnel in a store, service station, etc.	e. Teachers
f. Domestic workers and janitors	f. Some clerical and sales, if training is involved
g. Production workers	g. Unemployed, if trained as above
	h. Owns farm; employs others
	i. University student
	j. Military personnel
Residences	
a. Less than one room per person	a. One or more rooms per person
Cultural Activities	
a. No kindergarten	a. Went to kindergarten
b. No conversation at meals	b. Conversation at meals
c. Does not go to library	c. Goes to library
d. Does not read a book unrelated to school	d. Reads a book unrelated to school
e. Does not go out of town	e. Goes out of town
Job Aspiration	
a. Semi-skilled	a. Technical
b. Unrealistic, glamour job such as movie star or professional athlete	b. Professional
	c. Realistic in light of amount of planned education
Family Size	
a. One adult	a. Two adults
b. Three or more adults	b. Three or less children
c. Four or more children	

APPENDIX G

LIST OF WORD-PAIRS USED IN THE P-A LEARNING TASK

List of Word-Pairs Used in the P-A Learning Task

KING - LAND

FOOT - WALL

MOON - ROCK

HEAD - BALL

SALT - CITY

LAMP - ROOM

BATH - RING

STEM - WOOD

GIRL - SHOE

BABY - SACK

APPENDIX H

SAMPLE PAGE OF P-A RESPONSE BOOKLET

Sample Page of P-A Response Booklet*

KING	---	SING	STEM	QUEEN	MAN	RING	CALL	FIELD	BALL	LAND	SAND
FOOT	---	WALL	PANEL	WOOD	CALL	GOOD	ROOM	LAMP	SOOT	TOES	SHOE
MOON	---	STAR	HALL	WALL	SHIP	SOCK	HARD	WOOD	ROCK	NOON	BABY
HEAD	---	ROCK	BALL	DEAD	FOOT	TALL	RING	SING	GAME	HAIR	BODY
SALT	---	FOOD	SOUR	BATH	LAND	HALT	CITY	HAND	TOWN	ROOM	PITY
LAMP	---	LIGHT	TALL	WALL	LIVE	CAMP	BULB	ROOM	BOOM	MOON	SACK
BATH	---	SACK	SING	CITY	PITY	MATH	WATER	BELL	HEAD	RING	WASH
STEM	---	LIMB	KING	BALL	WOOD	GOOD	ROCK	LEAF	POLE	PLANT	GOOD
GIRL	---	LAND	SHOE	CURL	SALT	FOOT	GLUE	FOOT	WOMAN	BOY	CITY
BABY	---	LADY	TALL	SACK	BAGS	BALL	GIRL	TOYS	DOLL	BACK	SHOE

* Each page contained the same words in a different order.

APPENDIX I

RAW DATA

Table 10

Raw Data

Subject Number	SES	Sex	Condition	IM Category	IM Score	Ability Category	SCAT Score	Grade	Trials 1	2	3	4	5	6
029	1	M	N	L	09	H	284	8	00	00	00	00	00	00
197	1	M	N	L	06	H	268	7	05	00	00	00	00	00
279	1	M	N	L	10	H	287	8	06	02	00	00	00	00
815	1	M	N	L	07	H	281	8	06	01	00	00	01	02
046	1	M	M	L	09	M	258	7	08	04	00	01	00	00
109	1	M	M	L	09	M	269	8	04	00	01	01	00	00
225	1	M	M	L	06	M	274	8	04	00	00	00	00	00
787	1	M	M	L	05	M	260	7	02	00	00	00	00	00
057	1	M	N	L	10	M	256	7	04	02	02	01	00	00
195	1	M	N	L	05	M	260	7	05	02	00	00	00	00
280	1	M	N	L	05	M	277	8	04	00	06	02	01	03
712	1	M	N	L	10	M	260	7	05	03	01	00	00	00
032	1	M	M	L	07	L	250	7	06	04	03	00	00	00

APPENDIX E

JOB INTEREST QUESTIONNAIRE

Job Interest Questionnaire

1. What kind of job do you hope to have when you are 25 years old?

_____

2. How far do you plan to go in school? (A) until you are 16 (B) finish high school (C) some college (D) finish college (E) finish college and have some graduate level training?

3. What kind of job do you think your parents want you to have when you are 25? _____

4. How far do you think your parents want you to go in school? (A) untill you are 16 (B) finish high school (C) some college (D) finish college (E) finish college and have some graduate level training?

5. Does your father (or stepfather) live at home with you? Yes___ No___

6. What is the title of your father's job? _____

What are some of the things he does on his job? _____

_____

Does he have his own business or work for someone else? _____

_____

7. Does your mother have a paid job (in addition to being a housewife)? Yes___ No___

8. Describe your mother's job. _____

_____

9. Did you go to kindergarten or nursery school before you started to first grade? Yes___ No___

10. Do you usually get a chance to talk with your parents or other adults at supper or dinner? Yes___ No___

11. How many people under 18 years of age live with you (including yourself)? _____

12. How many people 18 years or older live with you? _____

13. How many rooms are there in your house or apartment including bathroom, kitchen, etc., but not including hallways? _____

14. During the next week do you expect to do any of the following: (A) visit relatives (B) go to a movie (C) go to the public library (D) travel out of town (E) read a book that has nothing to do with school?

15. How far did your father go in school? (A) until he was 16 (B) finished high school (C) had some college (D) finished college (E) finished college and had some graduate level training

16. How far did your mother go in school? (A) until she was 16 (B) finished high school (C) had some college (D) finished college (E) finished college and had some graduate level training.

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The parents' occupation is the best single estimate of SES; the parents' education is the next best predictor; residential information is next; and cultural activities should be given least emphasis.

The following is a general guideline to be followed. Remember the assignment to Group I or Group II is to be made on the overall quality information, not on just one or two items.

Group I	Group II
Low SES	Middle SES
Parents' Education	
a. Less than high school	a. Some college
b. High school graduate	b. College graduate
	c. Graduate training or above
Parents' Occupation	
a. Unskilled	a. Skilled, technical, supervisory
b. Semi-skilled	b. Professional
c. Unemployed and apparently unskilled	c. Executive
	d. Proprietor; owns medium or large business
d. Small farm or farm employee	

e. Untrained sales personnel in a store, service station, etc.	e. Teachers
f. Domestic workers and janitors	f. Some clerical and sales, if training is involved
g. Production workers	g. Unemployed, if trained as above
	h. Owns farm; employs others
	i. University student
	j. Military personnel

Residences

a. Less than one room per person	a. One or more rooms per person

Cultural Activities

a. No kindergarten	a. Went to kindergarten
b. No conversation at meals	b. Conversation at meals
c. Does not go to library	c. Goes to library
d. Does not read a book unrelated to school	d. Reads a book unrelated to school
e. Does not go out of town	e. Goes out of town

Job Aspiration

a. Semi-skilled	a. Technical
b. Unrealistic, glamour job such as movie star or professional athlete	b. Professional
	c. Realistic in light of amount of planned education

Family Size

a. One adult	a. Two adults
b. Three or more adults	b. Three or less children
c. Four or more children	

APPENDIX G

LIST OF WORD-PAIRS USED IN THE P-A LEARNING TASK

List of Word-Pairs Used in the P-A Learning Task

KING - LAND

FOOT - WALL

MOON - ROCK

HEAD - BALL

SALT - CITY

LAMP - ROOM

BATH - RING

STEM - WOOD

GIRL - SHOE

BABY - SACK

APPENDIX H

SAMPLE PAGE OF P-A RESPONSE BOOKLET

Sample Page of P-A Response Booklet*

KING	---	SING	STEM	QUEEN	MAN	RING	CALL	FIELD	BALL	LAND	SAND
FOOT	---	WALL	PANEL	WOOD	CALL	GOOD	ROOM	LAMP	SOOT	TOES	SHOE
MOON	---	STAR	HALL	WALL	SHIP	SOCK	HARD	WOOD	ROCK	NOON	BABY
HEAD	---	ROCK	BALL	DEAD	FOOT	TALL	RING	SING	GAME	HAIR	BODY
SALT	---	FOOD	SOUR	BATH	LAND	HALT	CITY	HAND	TOWN	ROOM	PITY
LAMP	---	LIGHT	TALL	WALL	LIVE	CAMP	BULB	ROOM	BOOM	MOON	SACK
BATH	---	SACK	SING	CITY	PITY	MATH	WATER	BELL	HEAD	RING	WASH
STEM	---	LIMB	KING	BALL	WOOD	GOOD	ROCK	LEAF	POLE	PLANT	GOOD
GIRL	---	LAND	SHOE	CURL	SALT	FOOT	GLUE	FOOT	WOMAN	BOY	CITY
BABY	---	LADY	TALL	SACK	BAGS	BALL	GIRL	TOYS	DOLL	BACK	SHOE

* Each page contained the same words in a different order.

APPENDIX I

RAW DATA

Table 10

Raw Data

Subject Number	SES	Sex	Condition	IM Category	IM Score	Ability Category	SCAT Score	Grade	Trials 1	2	3	4	5	6
029	1	M	N	L	09	H	284	8	00	00	00	00	00	00
197	1	M	N	L	06	H	268	7	05	00	00	00	00	00
279	1	M	N	L	10	H	287	8	06	02	00	00	00	00
815	1	M	N	L	07	H	281	8	06	01	00	00	01	02
046	1	M	M	L	09	M	258	7	08	04	00	01	00	00
109	1	M	M	L	09	M	269	8	04	00	01	01	00	00
225	1	M	M	L	06	M	274	8	04	00	00	00	00	00
787	1	M	M	L	05	M	260	7	02	00	00	00	00	00
057	1	M	N	L	10	M	256	7	04	02	02	01	00	00
195	1	M	N	L	05	M	260	7	05	02	00	00	00	00
280	1	M	N	L	05	M	277	8	04	00	06	02	01	03
712	1	M	N	L	10	M	260	7	05	03	01	00	00	00
032	1	M	M	L	07	L	250	7	06	04	03	00	00	00

Table 10
(Continued)

Subject Number	SES	Sex	Condition	IM Category	IM Score	Ability Category	SCAT Score	Grade	Trials 1	2	3	4	5	6
042	1	M	M	L	09	L	248	7	06	04	04	03	01	00
563	1	M	M	L	10	L	250	7	05	02	00	00	00	00
672	1	M	M	L	08	L	263	8	02	01	01	00	00	00
065	1	M	N	L	07	L	251	7	05	00	00	00	00	00
284	1	M	N	L	09	L	252	8	10	03	03	00	00	00
310	1	M	N	L	09	L	257	8	08	04	01	01	00	00
511	1	M	N	L	08	L	265	8	04	04	03	03	01	00
249	1	F	M	H	14	H	275	7	05	03	05	02	01	01
489	1	F	M	H	13	H	302	8	01	00	00	00	00	00
631	1	F	M	H	16	H	284	8	04	00	00	00	00	00
786	1	F	M	H	14	H	273	7	05	02	01	01	00	00
018	1	F	N	H	14	H	280	8	02	02	00	00	00	00
146	1	F	N	H	14	H	266	7	02	00	00	00	00	00

Table 10
(Continued)

Subject Number	SES	Sex	Condition	IM Category	IM Score	Ability Category	SCAT Score	Grade	Trials 1	2	3	4	5	6
289	1	F	N	H	15	H	283	8	00	00	00	00	00	00
520	1	F	N	H	16	H	280	8	07	03	00	00	00	00
119	1	F	M	H	17	M	269	8	09	02	00	00	00	00
622	1	F	M	H	13	M	279	8	01	01	01	01	01	01
684	1	F	M	H	16	M	269	8	05	03	03	00	01	00
805	1	F	M	H	13	M	260	7	07	02	00	01	00	00
063	1	F	N	H	13	M	263	7	06	02	00	01	00	01
184	1	F	N	H	13	M	258	7	04	06	01	02	01	03
190	1	F	N	H	16	M	261	7	02	01	00	00	00	00
830	1	F	N	H	13	M	273	8	04	00	00	00	00	00
209	1	F	M	H	18	L	268	8	01	00	00	00	00	00
541	1	F	M	H	17	L	252	7	00	00	00	00	00	00
548	1	F	M	H	13	L	253	7	02	00	00	00	00	00

Table 10
(Continued)

Subject Number	SES	Sex	Condition	IM Category	IM Score	Ability Category	SCAT Score	Grade	Trials 1	2	3	4	5	6
806	1	F	M	H	15	L	252	7	04	01	00	00	00	00
263	1	F	N	H	13	L	266	8	02	00	00	00	00	00
290	1	F	N	H	15	L	264	8	02	00	00	00	00	00
345	1	F	N	H	14	L	249	7	02	04	02	02	00	00
724	1	F	N	H	17	L	252	7	06	03	02	01	02	01
235	1	M	M	H	13	H	267	7	02	00	00	00	00	00
475	1	M	M	H	15	H	290	8	00	00	00	00	00	00
807	1	M	M	H	15	H	270	7	07	02	01	00	00	00
767	1	M	M	H	13	H	277	7	04	01	00	00	00	00
171	1	M	N	H	15	H	271	7	03	00	00	00	00	00
148	1	M	N	H	13	H	265	7	07	00	00	01	00	00
273	1	M	N	H	13	H	290	8	05	00	00	00	00	00
827	1	M	N	H	13	H	282	8	04	04	02	03	00	02

Table 10
(Continued)

Subject Number	SES	Sex	Condition	IM Category	IM Score	Ability Category	SCAT Score	Grade	Trials 1	2	3	4	5	6
218	1	M	M	H	13	M	270	8	10	07	07	04	02	03
221	1	M	M	H	14	M	277	8	06	03	03	01	01	02
329	1	M	M	H	13	M	259	7	03	00	01	01	01	00
332	1	M	M	H	16	M	258	7	06	04	01	00	00	00
341	1	M	N	H	13	M	256	7	08	03	01	02	00	00
708	1	M	N	H	13	M	277	8	03	02	02	02	02	02
711	1	M	N	H	15	M	274	8	05	02	00	00	00	00
713	1	M	N	H	14	M	257	7	10	07	05	04	01	04
314	1	M	M	H	13	L	250	7	05	00	00	00	00	00
334	1	M	M	H	15	L	254	7	05	00	01	00	00	00
676	1	M	M	H	13	L	264	8	04	03	01	01	01	00
800	1	M	M	H	14	L	254	7	03	03	02	03	03	00
076	1	M	N	H	15	L	249	7	01	00	00	00	00	00

Table 10
(Continued)

Subject Number	SES	Sex	Condition	IM Category	IM Score	Ability Category	SCAT Score	Grade	Trials 1	2	3	4	5	6
080	1	M	N	H	13	L	253	7	06	02	01	00	00	01
700	1	M	N	H	14	L	260	8	08	07	04	05	02	04
703	1	M	N	H	15	L	266	8	06	01	00	00	00	00
251	1	F	M	L	10	H	275	7	04	04	02	00	01	01
495	1	F	M	L	10	H	285	8	00	00	00	00	00	00
496	1	F	M	L	10	H	281	8	00	00	00	00	00	00
648	1	F	M	L	10	H	281	8	00	00	00	00	00	00
154	1	F	N	L	10	H	264	7	04	01	00	00	00	00
378	1	F	N	L	10	H	284	8	03	00	00	00	00	00
382	1	F	N	L	10	H	280	8	03	02	01	00	00	00
826	1	F	N	L	10	H	288	8	03	00	00	00	00	00
037	1	F	M	L	10	M	259	7	06	01	01	00	00	00
214	1	F	M	L	09	M	274	8	03	01	00	00	00	00

Table 10
(Continued)

Subject Number	SES	Sex	Condition	IM Category	IM Score	Ability Category	SCAT Score	Grade	Trials 1	2	3	4	5	6
472	1	F	M	L	09	M	262	7	05	02	02	02	02	01
803	1	F	M	L	09	M	263	7	07	04	00	00	00	01
024	1	F	N	L	10	M	274	8	00	00	00	00	00	00
061	1	F	N	L	10	M	259	7	05	03	03	00	02	01
583	1	F	N	L	08	M	271	8	04	01	01	00	00	00
691	1	F	N	L	10	M	275	8	02	00	00	00	00	00
102	1	F	M	L	08	L	259	8	05	05	02	00	00	00
120	1	F	M	L	10	L	266	8	06	01	00	00	00	00
211	1	F	M	L	10	L	261	8	03	00	00	00	00	01
537	1	F	M	L	10	L	249	7	10	05	01	06	07	08
004	1	F	N	L	10	L	259	8	04	00	01	00	01	00
260	1	F	N	L	08	L	265	8	05	05	01	01	01	01
361	1	F	N	L	09	L	254	7	09	02	01	00	00	00

Table 10
(Continued)

Subject Number	SES	Sex	Condition	IM Category	IM Score	Ability Category	SCAT Score	Grade	Trials 1	2	3	4	5	6
373	1	F	N	L	08	L	264	8	03	02	03	00	00	00
132	1	M	M	L	07	H	284	8	05	00	00	00	00	00
635	1	M	M	L	09	H	281	8	01	01	00	00	00	00
645	1	M	M	L	09	H	281	8	04	03	02	02	00	00
799	1	M	M	L	08	H	269	7	08	03	02	00	00	00
358	2	M	N	L	09	M	262	7	07	04	02	00	00	00
837	2	M	N	L	07	M	269	7	06	02	01	00	00	00
033	2	M	M	L	10	L	250	7	03	02	00	00	00	01
088	2	M	M	L	10	L	266	8	06	01	01	00	01	00
200	2	M	M	L	10	L	260	8	06	01	00	00	00	00
544	2	M	M	L	09	L	248	7	07	03	03	01	02	01
069	2	M	N	L	10	L	252	7	07	03	00	00	00	00
281	2	M	N	L	10	L	263	8	06	05	03	00	00	00

Table 10
(Continued)

Subject Number	SES	Sex	Condition	IM Category	IM Score	Ability Category	SCAT Score	Grade	Trials 1	2	3	4	5	6
309	2	M	N	L	10	L	259	8	07	04	02	02	03	00
726	2	M	N	L	08	L	253	7	03	02	00	00	00	00
114	2	F	M	H	17	H	283	8	00	00	00	00	00	00
440	2	F	M	H	14	H	267	7	07	01	00	00	00	00
775	2	F	M	H	14	H	268	7	10	09	04	04	03	03
760	2	F	M	H	13	H	276	7	00	00	00	00	00	00
156	2	F	N	H	14	H	265	7	06	03	01	00	00	00
168	2	F	N	H	16	H	265	7	04	00	00	00	00	00
301	2	F	N	H	13	H	290	8	06	00	00	00	00	00
379	2	F	N	H	13	H	294	8	02	02	00	00	00	00
241	2	F	M	H	14	M	258	7	02	02	01	00	00	00
316	2	F	M	H	15	M	263	7	00	00	00	00	00	00
625	2	F	M	H	13	M	279	8	00	00	00	00	00	00

Table 10
(Continued)

Subject Number	SES	Sex	Condition	IM Category	IM Score	Ability Category	SCAT Score	Grade	Trials 1	2	3	4	5	6
797	2	F	M	H	15	M	259	7	05	02	02	00	00	00
017	2	F	N	H	14	M	270	8	04	00	00	00	00	00
028	2	F	N	H	15	M	277	8	04	01	00	00	00	00
337	2	F	N	H	13	M	256	7	03	01	01	01	00	01
739	2	F	N	H	14	M	263	7	03	01	01	00	00	00
108	2	F	M	H	15	L	268	8	03	02	02	00	00	00
115	2	F	M	H	15	L	266	8	02	00	00	00	00	00
545	2	F	M	H	13	L	248	7	07	05	06	04	04	04
688	2	F	M	H	16	L	262	8	00	00	02	00	00	00
020	2	F	N	H	13	L	268	8	07	01	05	03	02	01
278	2	F	N	H	13	L	268	8	08	06	04	02	02	00
186	2	F	N	H	14	L	254	7	00	00	00	00	00	00
524	2	F	N	H	13	L	267	8	03	01	00	00	00	00

Table 10
(Continued)

Subject Number	SES	Sex	Condition	IM Category	IM Score	Ability Category	SCAT Score	Grade	Trials 1	2	3	4	5	6
227	2	M	M	H	14	H	266	7	01	00	00	00	00	00
231	2	M	M	H	14	H	274	7	00	00	00	00	00	00
477	2	M	M	H	13	H	301	8	00	00	00	00	00	00
245	2	M	M	H	13	H	273	7	04	04	00	01	02	00
160	2	M	N	H	14	H	274	7	00	00	00	00	00	00
144	2	M	N	H	14	H	276	7	00	00	00	00	00	00
340	2	M	N	H	13	H	265	7	06	03	01	03	01	01
365	2	M	N	H	16	H	287	8	05	03	01	01	00	01
207	2	M	M	H	14	M	271	8	03	01	02	00	00	00
236	2	M	M	H	13	M	262	7	08	03	00	00	00	00
651	2	M	M	H	14	M	279	8	02	01	00	00	00	01
795	2	M	M	H	13	M	256	7	07	03	01	00	00	00
070	2	M	N	H	17	M	262	7	03	01	01	00	00	00

Table 10
(COntinued)

Subject Number	SES	Sex	Condition	IM Category	IM Score	Ability Category	SCAT Score	Grade	Trials 1	2	3	4	5	6
183	2	M	N	H	13	M	262	7	04	02	01	00	00	00
253	2	M	N	H	14	M	271	8	01	01	00	00	00	00
828	2	M	N	H	14	M	277	8	05	05	05	00	00	00
054	2	M	M	H	13	L	252	7	03	02	03	01	00	00
215	2	M	M	H	16	L	268	8	04	02	02	01	00	00
325	2	M	M	H	15	L	254	7	10	05	02	03	01	02
138	2	F	M	L	09	H	281	8	01	00	00	00	00	00
242	2	F	M	L	10	H	273	7	01	00	00	00	00	00
500	2	F	M	L	09	H	291	8	01	00	00	00	00	00
796	2	F	M	L	10	H	267	7	02	00	00	00	01	00
147	2	F	N	L	07	H	266	7	03	00	00	00	00	00
158	2	F	N	L	09	H	266	7	00	00	00	00	00	00
302	2	F	N	L	10	H	289	8	05	03	01	01	00	00

Table 10
(Continued)

Subject Number	SES	Sex	Condition	IM Category	IM Score	Ability Category	SCAT Score	Grade	Trials 1	2	3	4	5	6
359	2	F	N	L	10	H	266	7	05	00	00	00	00	00
106	2	F	M	L	06	M	269	8	00	00	00	00	00	01
248	2	F	M	L	09	M	263	7	04	04	04	04	04	01
499	2	F	M	L	10	M	279	8	05	01	00	01	01	01
595	2	F	M	L	10	M	276	8	02	01	01	00	00	00
001	2	F	N	L	10	M	274	8	04	00	01	00	00	00
067	2	F	N	L	09	M	263	7	04	02	03	00	00	00
270	2	F	N	L	09	M	270	8	04	00	00	00	00	00
384	2	F	N	L	09	M	277	8	01	02	02	00	00	01
095	2	F	M	L	09	L	264	8	03	00	00	00	00	00
447	2	F	M	L	08	L	255	7	03	02	01	01	00	01
324	2	F	M	L	10	L	251	7	05	04	00	00	00	00
002	2	F	M	L	08	L	262	8	06	01	01	00	00	00

Table 10
(Continued)

Subject Number	SES	Sex	Condition	IM Category	IM Score	Ability Category	SCAT Score	Grade	Trials 1	2	3	4	5	6
271	2	F	N	L	10	L	264	8	06	02	01	01	00	00
362	2	F	N	L	10	L	252	7	07	01	02	00	00	00
521	2	F	N	L	10	L	268	8	06	00	00	00	00	00
526	2	F	N	L	08	L	264	8	01	00	02	00	00	00
129	2	M	M	L	09	H	294	8	05	01	00	00	00	00
473	2	M	M	L	07	H	296	8	04	01	00	00	00	00
764	2	M	M	L	09	H	273	7	05	00	00	00	00	00
753	2	M	M	L	09	H	268	7	01	00	00	00	00	00
199	2	M	N	L	05	H	264	7	05	00	00	00	00	00
162	2	M	N	L	10	H	271	7	03	00	00	00	00	00
709	2	M	N	L	07	H	280	8	04	00	00	00	00	00
733	2	M	N	L	10	H	268	7	04	01	01	02	00	00
111	2	M	M	L	10	M	269	8	09	05	00	00	00	00

Table 10
(Continued)

Subject Number	SES	Sex	Condition	IM Category	IM Score	Ability Category	SCAT Score	Grade	Trials 1	2	3	4	5	6
112	2	M	M	L	05	M	276	8	02	00	00	00	00	00
474	2	M	M	L	10	M	279	8	05	03	04	04	00	03
558	2	M	M	L	10	M	260	7	05	00	01	00	00	00
006	2	M	N	L	10	M	279	8	05	05	01	00	00	00
254	2	M	N	L	07	M	272	8	03	03	01	00	00	00
677	2	M	M	H	13	L	255	8	00	00	00	00	00	00
031	2	M	N	H	13	L	249	7	07	03	00	00	00	00
022	2	M	N	H	14	L	268	8	03	00	02	00	00	00
727	2	M	N	H	13	L	252	7	09	06	02	02	02	01
738	2	M	N	H	14	L	252	7	06	00	03	00	00	00

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